

MOTOR AGE

Vol. XXXII
No. 4

CHICAGO, JULY 26, 1917

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Spark Plugs

Columbia Six

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Champion Spark Plug Co., Toledo, Ohio

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In This Issue—America's National Parks

Van Sicklen +

HUPMOBILE

United America Tour

Words cannot express our appreciation of the faithfulness shown by the Van Sicklen Speedometer in guiding us over all highways, mountain passes filled with snow, desert trails and rain-swept country****



"From hottest of Summer days to 30 degrees below zero***Our mileage tallied in every instance with that recorded in our Blue Book."

Catalog of Van Sicklen Speedometers mailed on request.

The Van Sicklen Company — Elgin Illinois Factory — Elgin National Watch Co.

MOTOR AGE

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ANNOUNCEMENT

It is said the criminal always leaves a clue. Next week MOTOR AGE will feature an article which tells how motor cars have been responsible for the capture of criminals and also how the trade of thievery has grown and what measures sometimes have to be taken to recover stolen cars. Motor criminology, if it may be termed that, rapidly is becoming Bertillonized, and the manner in which this is being done will be told in the feature story next week.

"NORMA" BALL BEARINGS (PATENTED)



The failure of a magneto bearing will stop a car or truck as completely as a broken axle. The failure of a bearing in the lighting generator is as serious as a break-down of the whole electrical system. No bearing in a car or truck is more important than the magneto and generator bearings.

As to the superlative dependability of "NORMA" Ball Bearings, makers of high-grade magnetos and lighting generators are practically unanimous—expressing their confidence by standardizing their apparatus on "NORMA" Ball Bearings.

Be sure—see that your
Electrical Accessories
Are "NORMA" Equipped



THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
Ball, Roller, Thrust and Combination Bearings

DETROIT USE PROVES POPULARITY

Personal Count Determines Canadian's
\$25,000 Investment.

Before [redacted], of [redacted], invested his \$25,000 in a distributing station he decided that the car he handled would have to be popular enough to insure him a genuine profit on his capital. After a bit of Canadian conjecture, he evolved an idea which seemed quite likely to solve the question of car popularity. He hit on an original method of determining by actual vote which of the six cars under consideration was enjoying the most favor among automobilists generally. Impressed with the ingenuity of his own idea, he forthwith journeyed to Detroit, America's foremost automobile center, to put it into practice. To make doubly sure that his count would be exact, he took his son, [redacted], with him.

At the intersection of State street and Woodward avenue, the heart of Detroit's traffic, he stationed himself on one side of the avenue and his son on the other. For two hours on three afternoons both made note of the machines that passed up and down the thoroughfare. That they were helping to pass verdict on the investment of \$25,000 was unknown to the various drivers. The result of the vote revealed that of the six makes checked the [redacted] was the car most patronized by Detroit motorists. The two counts, one a check on the other, convinced [redacted] that the [redacted] car would appeal to Canadians as strongly as it had to Detroiters.

"I know that Woodward avenue and State street is one of the busiest corners in the world, and I based my contemplated investment on whatever an actual count of cars at that corner might show me." was [redacted] message to the [redacted] company. "The double count convinced me as nothing else could have done that if in Detroit, where competition is so severe, the [redacted] is so favored among buyers, it was the car for me to take on for the Canadian territory."

The [redacted] car now graces [redacted] distributing station at [redacted]

Reproduced from a leading
Automobile Trade Paper
for July 14, 1917

But the OFFICIAL Figures say— STUDEBAKER

The clipping at the left of this page shows an ingenious way for a dealer to select a car.

It was not possible for the dealer who instituted this test to obtain a Studebaker distributorship.

Studebaker already had an excellent dealer in his territory.

But if Studebaker had not—how easy his problem would have been to solve!

Official registration figures for the City of Detroit show that on May 31st, 1917, there were 2,492 Studebaker cars registered, 174 more than any car selling at over \$500.

And more than twice as many as the car this dealer finally chose.

Studebaker dealers have the satisfaction of knowing that in Detroit where 80% of all cars are made, where thousands of people are directly connected with the industry, where automobile competition is unusually severe, there are more Studebaker cars in use than any other car selling at over \$500.

This proves that the people best equipped to judge automobile values select Studebakers in preference to any other car.

The Studebaker de Luxe models in the following colors—purple lake, chrome green, auto blue and battleship gray are beautiful cars—the demand for them is increasing daily.

STUDEBAKER

Detroit, Mich. South Bend, Ind. Walkerville, Ont.
Address all correspondence to South Bend

It pays to be a *Studebaker* dealer

MOTOR AGE

At Home—The National Parks by Ruth Sanders

A glimpse of Ranier from Paradise valley is a glimpse from the summer of camping to the winter of glacier, shown more clearly in the small oval in which Stephen T. Mather, director of the National Park Service, stands at the left in front of Nisqually Glacier in Ranier National Park



THE National Parks are the oldest yet the newest of American residents. They are the none greater than whom in American lineage—the last word of the four hundred and the quintessence of those belonging to the Order of First Families. They are new in that their democracy has not been advertised enough. America is only just learning that all will delight in their hospitality eventually, so why not now. In fact, it was not until Aug. 1 1915, that the Yellowstone opened its door to the motor car and made universal, to motorists as well as to the non-motoring public, the invitation “At Home—the National Parks.”

Last year 142,387 tourists were entertained by the National Parks.* More than half of them were motorists. This year another broken record is expected in spite of the unusual season that has made the dirt roads of the West difficult. A director

of the National Park Service has been appointed since last season. Information has been mobilized. Detailed maps, on which good and bad roads are distinguished and trails are shown, distances are indicated and places where gasoline and water may be obtained are pointed out, are available.

As is customary in the organization of the gens certain members of the National Parks family are more prominent than the others; these we say are of the first order, so to speak. They are those which rank first in size and scenic magnificence, those which, considered together, contain more features of conspicuous grandeur than are readily accessible in all the rest of the world put together; those which, considered separately, can equal or excel all but a few, if not all, of the celebrated scenic places within easy reach abroad.

Where Ages Are Old

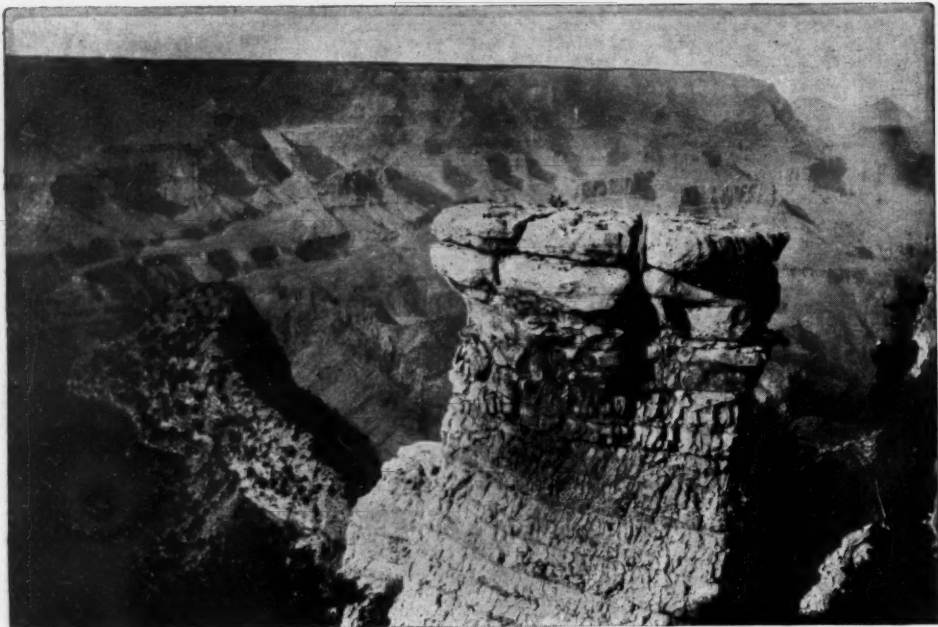
Yellowstone Park, for instance, contains more geysers of large size than are in all the rest of the world put together. Yosemite Valley has no equal in striking

beauty, while nowhere can the Grand Canyon of the Colorado be excelled in size and exquisite coloring. The very ages are old in the huge and ancient trees of the Sequoia National Park.

To this first order belong Mount Ranier National Park in Washington, Crater Lake National Park in Oregon, Yosemite and Sequoia National Parks in California, Glacier National Park in Montana, Yellowstone National Park in Wyoming principally, with a couple of strips in Idaho and Montana, and Rocky Mountain and Mesa Verde National Parks in Colorado. To these eight usually is added the Grand Canyon, which, though a National Monument rather than a National Park, is the eighth, if not the first, wonder of the world.

The National Parks are most interesting when taken together in that they are so different when taken separately. One may visit a new National Park each year for

*For rules and regulations of motor traffic in the National parks see Motor Age for April 5.



No picture, even if painted, can tell you what your eyes do in the Grand Canyon

nearly a decade and visit something distinctly new each time.

Yellowstone National Park is a wooded wilderness of 3300 square miles. Noted for its geysers, were there none, it still would be worth its position as a National Park, with its watershed, its canyon. Were there no watershed and no canyon, the scenic wilderness with its incomparable wealth of wild animals would remain to make it rich in worth.

Yosemite National Park contains a valley that is world famous; the valley is merely a 7-mile line in a scenic masterpiece of 1100 square miles. In the north the Tuolumne river spouts wheels of water 50 ft. and more into the air. Summits of perpetual snow beckon the climber to come see a sublime wilderness of crowded, towering mountains, so contradictory to the silence of the valley.

Sequoia National Park contains the oldest living thing, the General Sherman Tree. When Christ was born it was 1500 years old. Hundreds of other trees in the forest there were growing when Christ was born; hundreds flourished while Babylon was in its prime; several antedate the pyramids on the Egyptian desert. There, if nowhere else, is the proof of the validity in the claim that the National Parks are the oldest yet the newest of American residents, for this member of the family is far, far older than the discoverer of America.

A Volcano But Quiet

Mount Ranier is an extinct volcano. It towers 14,408 ft. above tide water in Puget Sound, and home-bound sailors far at sea mend their courses from its silver summit.

Crater Lake is the deepest and bluest lake in the world. Once Mount Mazama, another smoking peak, raised its noble head. Then Mount Mazama fell into itself, and Crater Lake took its place.

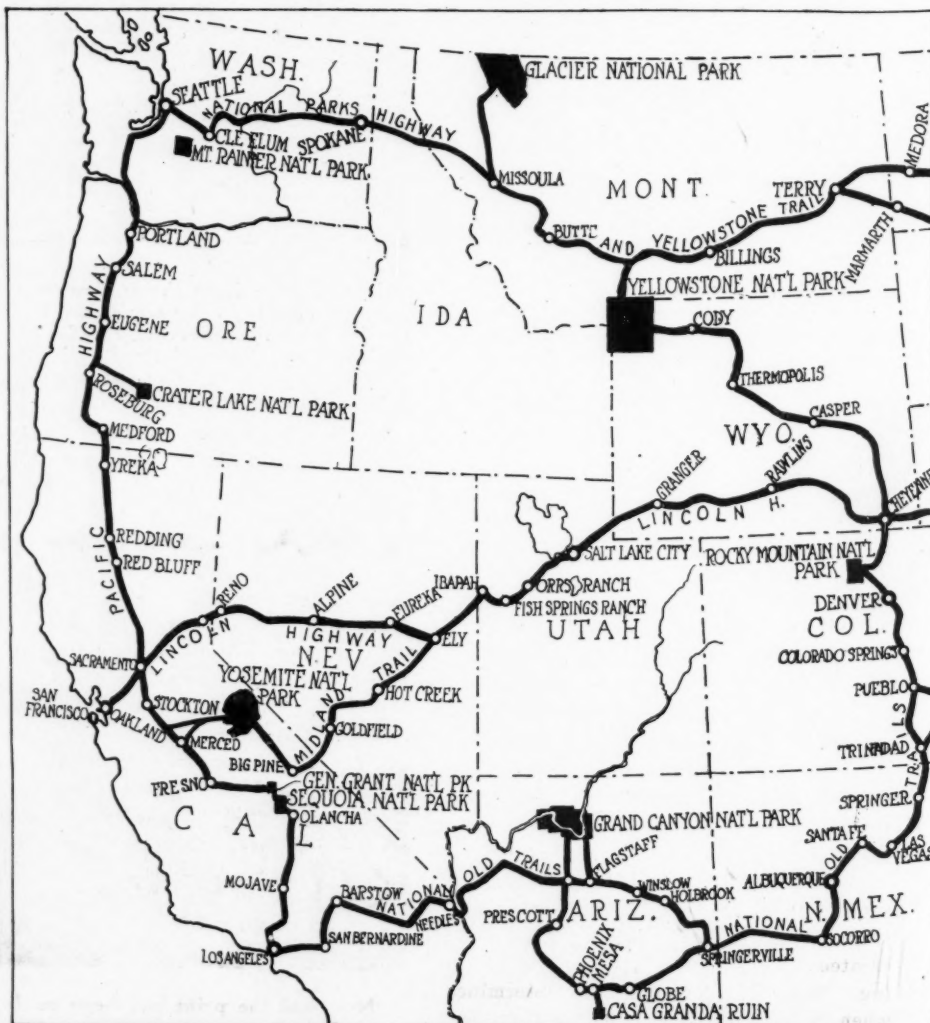
Mesa Verde National Park serves as a monument to the prehistoric American. In its barren canyons are the ruins of former palaces, and in its ruins are the ceramic and other art of a forgotten people.

Glacier National Park has its supreme glory in its lakes. More than sixty glaciers feed the hundreds of lakes, one of which floats icebergs all summer. It is an American Alpine paradise.

Rocky Mountain National Park is "The Top of the World," for Americans at least. The park straddles the Continental Divide. Its eastern gateway is Estes Park, a valley village of hotels. Cliff-cradled, glacier-watered valleys are unexcelled for wilderness and beauty of flowers.

The Grand Canyon has a language of its own which does not permit transposition into others. The wanderer on the rim overlooks a thousand square miles of pyramids and minarets carved from painted depths. Miles away and a mile below he sees the silver thread of the Colorado. The Colorado river is formed by the confluence of the Grand and the Green rivers. Together they gather the waters of 300,000 square miles. The many canyons reach a tremendous climax in northern Arizona.

The Grand Canyon is a national monument administered by the Department of Agriculture. In it was written the culminating chapter of one of the most stirring adventures of American exploration. Tales of whirlpools, of hundreds of miles of underground passage and of giant falls



Here are the paths that take you through the National parks that belong to the first order

whose roaring music could be heard on distant mountain summits were current of the Grand Canyon, and few would venture in. In 1869 a geologist and a school teacher, a one-armed veteran of the Civil War, John Wesley Powell, afterward director of the United States Geological Survey, dared and conquered. He found no impassable whirlpools, no underground passage and no cataract. But four men who deserted, hoping to climb the walls, were never heard from again, though on the same day Major Powell and his faithful half dozen floated clear of the Grand Canyon into safety.

Those motorists who so desire can swing around a 6000-mile circuit of the parks which will take in Yellowstone, Glacier, Ranier, Crater Lake, Yosemite, General Grant and Sequoia from Chicago as a starting point, or can make the more restricted tour of the wonderlands, which starts from Denver and touches Yellowstone, Glacier, Ranier, Crater Lake, Yosemite, General Grant and Sequoia, the Grand Canyon, Mesa Verde and Rocky Mountain. The park circle tour is given in the accompanying map.

More Than Guardian Angels

A resident supervisor is in charge of each park, and under him are enough park rangers to protect the forests from fire, the wild animals from hunters and the visitors from harm. In these parks are good motoring roads, and hotels and public camps enable visitors to stay there as long as they like. Trails lead to the various waterfalls, up the mountain heights and wherever some fine view is to be obtained. Many of the hotels offer the comforts and luxuries of city life. Other hotels are comfortable but economical. At the public camp one registers as at the hotel, only he gets a tent instead of a room and eats his meals at a big table in a big dining tent. Another big tent usually serves as living room. At night a camp fire adds to the fun of park life, and many who can afford the luxurious hotels seem to prefer the camps.

The National Parks are inviting the student of nature as well as the casual tourist. No trees are cut for lumber as in the national forests. No animals are killed, except the mountain lions and other predatory beasts which destroy the deer and young elk. No sheep or cattle are permitted at large in the beautiful meadows of luxuriant grasses and gorgeous wild flowers. The student and the lover of nature can study nature unspoiled as in the days when these lands still were too remote for invasion by man.

Forests Primeval

The National Parks differ from the National Forests. The forests aggregate many times the area of the parks. They were created to conserve lumbering and grazing. Scientific forestry now determines when a tree shall be cut. The smaller trees are spared to grow to a certain size,

so that the forests may be perpetuated. Sheep and cattle graze under governmental regulations, and regulated hunting is permitted in season. The parks, on the other hand, are for the rest, recreation and education of the people only; they are the forest primeval, while the others are the forest of scientific commercialism.

Shooting in the Yellowstone has been prohibited since 1872. As a result one can, with reasonable care, photograph deer at close quarters, approach elk and antelope and even moose and bison near enough for good pictures, while the bears may be coaxed in true park-squirrel fashion occasionally. Sometimes Bruin becomes too familiar. Many a camper has returned to his tent to find Br'er Bear has been there and picked the best at his leisure.

The Yellowstone and Yosemite, the oldest and probably best known universally of the national parks, are marked by different characteristics entirely. Strangeness and almost unearthly weirdness impresses the visitor to the Yellowstone most. Beauty is most striking in the Yosemite. Even the grandeur of mountain peaks and cliffs and powerful torrents that sweep in mighty falls are not more impressive than marvel-

ous Mirror Lake, the green and crystal river, brooks, forest and wild flowers, shut in by towering mountains in this peaceful valley.

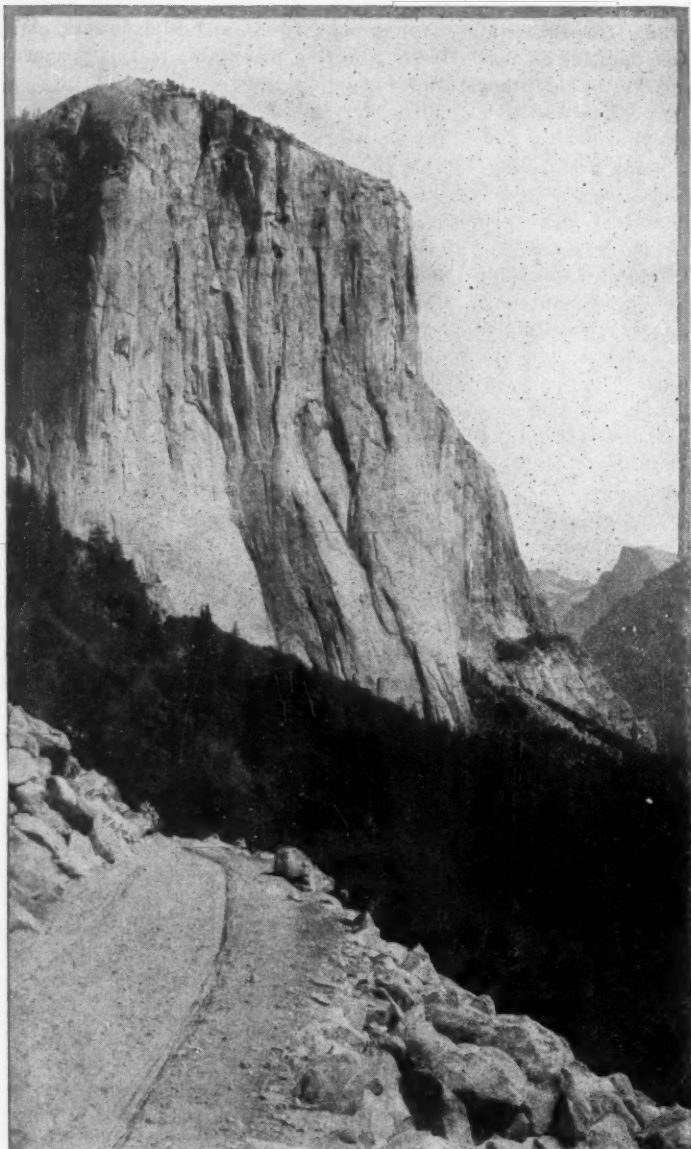
The forests of the Yellowstone should not be compared to those of the Yosemite. They cannot be. Really fine individual trees are rare in the Yellowstone. Pines spring up over the fallen trunks, filling all growing space closely here and there, while a large part of the mountains is devoid of tree growth, and comparatively level tracts may be quite treeless. The glory of Yellowstone no doubt is not its geysers, of which it has a larger number than the rest of the world has, but Yellowstone lake, a body of pure water covering about 150 square miles. The lake lies 7741 ft. above sea level and is edged by mountains. The water is light green in color, and myriads of tiny bubbles rise from the multitude of hot springs which flow into the bottom of the lake.

Always Hospitable

Yosemite is a park of all seasons. In the spring the melting snows turn the waterfalls into torrents. In the summer the highest trails are accessible, the weather is delightful and the atmosphere has a



Photo by F. H. Kiser
Not until the print had been made did the photographer realize he had caught this much of the tantalizing depths of Crater Lake and the phantom ships in the background



El Capitano guards the road just here as you make the Big Oak-Flat grade on the way from the Tuolumne grove of Big Trees to the Yosemite

restful and invigorating effect. In the autumn the air is clear, making more wonderful the rock and crag, which stand out as if etched against the sky. In the winter red snow plants grope their way to the open above the snow. Summer is said to be the best time for a visit. In May some of the trails are likely to be closed by snow. By the middle of June all trails are open, and the falls still are full. It is said that if one can plan two visits let him or her come late in April and go around the valley itself. Then the riotous Merced and the waterfalls will be in all their power and glory. Another trip late in July or August will give better opportunity for mountain climbing and visiting the great trees.

California has three national parks, the Yosemite, the Sequoia and the General Grant. The largest trees in the world are found in these parks. All three parks were established in 1890. The trees grow upward for more than 300 ft. and have a cir-

cumference at the base of more than 100 ft. The bark sometimes exceeds 3 ft. 4 in. in thickness. Rings in the trunk show many of the trees are more than 3000 years old. Their branches are not swayed nor are their trunks bent by the fiercest wind; they stand calm, silent and majestic, unmoved by life around them.

General Grant Park has only one grove; Sequoia has twelve. Here within an area of 237 square miles are found more than a million of these trees, many of them merely a few hundred or a thousand years old, many two or three thousand years old. Sequoia National Park also is the gateway to one of the greatest scenic areas in the land. To the north and east exist wild rivers and tortuous canyons, whose glacier-carved precipices and vast snowy summits culminate in the supreme altitude of Whitney.

Nine years after the creation of Yosemite, Sequoia and General Grant parks, an act of Congress preserved for Americans the largest glacial system in North America radiating from a single peak. This is Mount Ranier in Western Washington.

Forty-eight square miles of glaciers are included in this region, and yet flowers as beautiful as those of the Yosemite grow within the confines of the park. Approaching Mount Ranier one passes through areas in which the climate and the vegetation range from temperate to arctic. The lower valley is thickly covered with fir, hemlock and cedar. The undergrowth is dense, and the forest floor is carpeted with moss and a litter of fallen branches and decayed wood. As the mountain is climbed the vegetation changes. At 4000 ft. the forest is of mountain hemlock, Alpine fir and Alaska cedar. Climbing, the trees become smaller, are gnarled and twisted, dwindle to straggling bushes, and then bare rocks, polished and scarred by masses of snow and ice that have swept over them. The last 4 miles to the summit is along ridges between glaciers or over ice, dangerous without a guide.

Crater Lake, as has been said, is the deepest and bluest lake in the world. It measures 2000 ft. of water and its cliffs from sky-line to surface are 1000 ft. high. It has no inlet and no visible outlet but occupies the hole left when, in the dim ages before man, a volcano collapsed and disappeared within itself. Its color is wonderful, blue in a setting of pearly lavas relieved by pine green and snow white, all changing with every atmospheric change and shift of light. It was made a national park in 1902.

The Indians Know

An Indian legend paints Llao Rock at Crater Lake. According to the legend of the Klamath and Modoc Indians the mystic land of Gaywas was the home of the great god Llao. His throne was in the infinite depths of the blue water, surrounded by his warriors, giant crawfish able to lift great claws out of the water and seize enemies on the cliff tops. War broke out with Skell, neighboring god. Skell was captured, and Llao's warriors used his heart for a ball. An eagle, one of Skell's servants, caught it, and a deer, another servant, escaped with it, and Skell's body grew again around his living heart. Then Llao was captured; upon the highest cliff



Br'er Bear and his numerous kin prove quite some sociable welcomers to the Yellowstone, especially if you live in a tent at night

his body was torn into fragments and cast into the lake to be eaten by his own warriors under the impression that it was Skell's body. When Lloa's head was thrown in, the warriors recognized it and refused to eat it. The head still lies in the lake, and white men call it Wizard Island. The cliff is Lloa Rock.

Indians to-day shun the Mesa Verde, the "Green Mesa" park since 1906. They believe it is inhabited by spirits whom they call the Little People. All too vain to tell them the Little People were their ancestors; they refuse to believe it. The Indians say the Little People will not stand the telephone poles and wires long—though the Little People have been standing it since 1915.

Glacier, once the favorite hunting ground of the Blackfoot Indians and now for seventeen years strictly preserved, is chiefly remarkable for its picturesquely modeled peaks, the unique quality of its mountain masses, its gigantic precipices and the romantic loveliness of its 250 lakes. All this in spite of the sixty glaciers from which it derives its name.

So rare is the scenic combination found in the valleys of this park that it is difficult to single out any part of these 1500-square miles that is more remarkable than any other. The park lies in northwestern Montana, abutting the Canadian boundary, and incloses the Continental Divide at that point. One spot is known as the Triple Divide, as at that spot waters flow into the Pacific Ocean, Hudson Bay and the Gulf of Mexico. The peculiar rugged character of the park is practically limited to its boundaries. To the north the mountains become low, rounded ridges. South and west, though still fine, the mountains lose the quality of majesty. Eastward are the plains.

Dropping Down to Water

From the Continental Divide seven principal valleys drop precipitously upon the east, twelve sweep down the longer western slopes. At the foot of each valley is a greater lake to which are tributary many smaller lakes of astonishing wildness. St. Mary Lake on the east side and Lake McDonald on the west side are the largest in the park. Many of the smaller lakes are candidates for celebrity. Of these Lake McDermott with its minaretted peaks stands first, best known perhaps because there is one of the finest hotels in any national park and a luxurious camp.

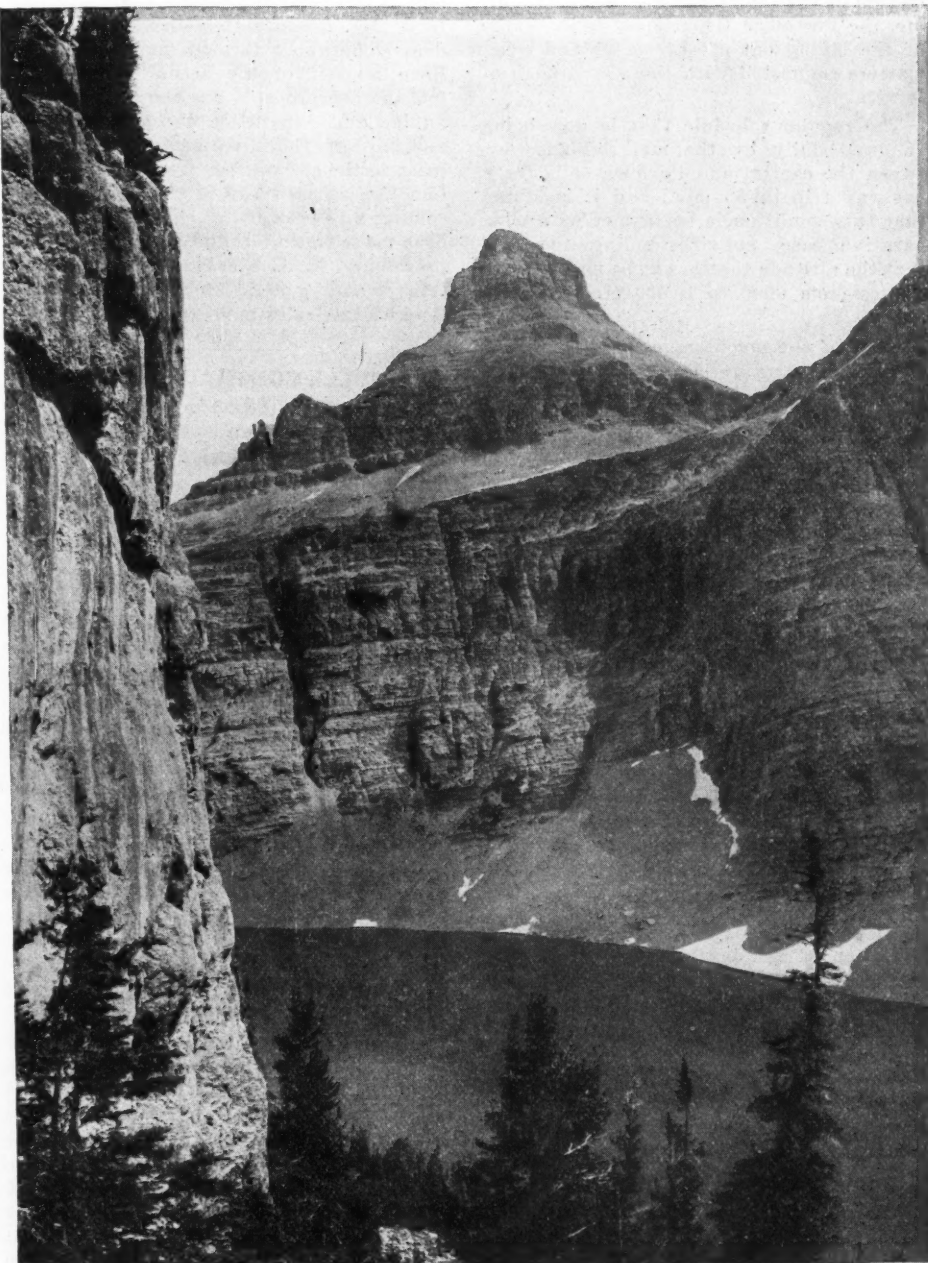
Rocky Mountain National Park, created in 1915, is comparatively new and hence one of the least known though not by any means the least deserving. For many years the Mecca of Eastern lovers of mountains has been the Rockies. Rocky Mountain park was chosen as a representative to be preserved for all time. In the eastern gateway is Estes Park, 8000 ft., or more than a mile and a half, above sea level. These mountains are part of the Continental Divide, and for this reason the

people of Colorado call their mountains the top of the world.

Nowhere else perhaps is the struggle of winter gales and trees so easily accessible to tourists of average climbing ability. Just at timberline, where the winter temperature and the fierce winds make tall trees impossible, the spruces lie on the ground as vines do; then come low birches which give place to small piney growths and finally to tough straggling grass, hardy mosses and tiny Alpine flowers. Even at the highest altitude flowers grow in gorgeous glory. Large and beautiful columbines can be found as late as September in the lee of protecting snow banks and glaciers. The trees which have been there for years are apt to be twisted and gnarled beyond recognition. Others find strength in union of thick groups. Once above timberline the bare mountain masses rise from 1000

to 3000 ft. in sheer precipices. They are the great, bare granite masses from which the Rocky Mountains got their name. Their color changes with the light, fair and rosy at sunrise and sunset, cold and dark on a cloudy day.

The discovery of the national parks by the motorists, or rather the extension of the invitation of the national parks to the motorists, was profitable to the government. Last season motor tourists paid \$65,311 in fees for the privileges of taking their cars with them to wonderland. The receipts were much larger than ever before, though the fees were reduced in Ranier, Glacier and General Grant and only slightly increased in one, Crater Lake. The rates are based on the mileage of motor roads in each park. Yellowstone has the most; General Grant and Glacier the least.



Old Man Reynolds beams with proprietorship on Hidden Lake, for he knows as long as Glacier National Park is the two will live

Mexican Mail by Air

Southern Republic Establishes Aero Service for Handling Postal Matter

Extended Use Expected to Be Developed

MONTEREY, Mexico, July 20—According to information that has been received here the recent establishment by the Department of War and Marine of the Mexican Government of an aerial mail line between the City of Mexico and Pachuca, a distance of 110 miles, is the forerunner of a very extensive system of carrying the mails by biplanes that is to be inaugurated in this country. Although the machines were built and are operated under the direction of the Department of War and Marine, the Postoffice Department is in charge of the laying out of the routes and other matters connected with the new branch of service.

The regular schedule that is now being followed daily by the mail biplanes between the capital and Pachuca calls for a one-way trip in 58 min., and it is stated that this condition is being met with comparative ease, notwithstanding the fact that the altitude that has to be encountered ranges from 8000 to 10,000 ft. above sea level.

Each of the machines now in service is capable of carrying 500 lbs. of mail, it is announced. The biplanes are of Mexican manufacture, but whether they are made from a new type or are patterned after existing machines is not known here.

It is authoritatively stated that the success of the City of Mexico-Pachuca line has caused the government to take steps to install similar mail service between the capital and the cities of Guadalajara, San Luis Potosi, Aguas Calientes and Puebla.

WRIGHT FIELD IS DEDICATED

Dayton, Ohio, July 23—Formal dedication of the Wilbur Wright Federal flying field took place recently when Capt. A. R. Christie made a 10-min. flight in one of the new instruction planes. Eleven students have arrived from Ohio State University, and actual work has begun.

STEGEMAN EXPANDS PLANT

Milwaukee, Wis., July 21—With the installation of new machinery, and the completion of additions to its factory, the Stegeman Motor Car Co. has increased its production considerably. J. K. Sinyard, until recently a factory executive with the Nash Motors Co., has been appointed works manager and W. Port, formerly of Mitchell Motors Co., has become purchasing agent.

USED CAR MEN ORGANIZE

New York, July 23—Used car managers representing members of the Automobile Dealers' Association of New York have started an organization as a means of solving the problems that are encountered by all of them. At a luncheon Friday at the

Hotel Woodward these officers were elected: Chairman, L. J. McCracken, Willys-Overland; vice-chairman, Walter Broadhead, Marmon; secretary, W. H. Barnhard, Colt-Stratton Co., Cole and Dodge.

At the next meeting, to be held the second week in September, each member will present a paper on what he considers the greatest field of work for the association. The organization will be operated under the auspices of the dealers' association. Many possible benefits are in view, according to Manager Charles A. Stewart of the dealers' organization, who called the session and is assisting in the work.

FIGGIS HEADS SMITH TRUCK

Chicago, July 22—D. W. Figgis, formerly vice-president Smith Motor Truck Corp., has become president of the corporation, succeeding E. I. Rosenfeld, who has been the guiding spirit of the corporation throughout its formative period and who now is the chairman of the board of directors. Mr. Rosenfeld's retirement as president came about through his desire to relieve himself of the actual management, but the concern still has the benefit of his advice and experience through his chairmanship of the directorate. Mr. Figgis came to the corporation from the American Can Co., as assistant to the president, becoming vice-president. C. R. Hammer has been made treasurer, and B. E. Veach, vice-president. L. A. Stebbins remains as secretary and general counsel, and Barry Rockwell as sales manager.

MAXWELL CONTRACTS BEGIN BIG

Detroit, July 23—The Maxwell Motor Sales Corp. of Detroit closed contracts with distributors and dealers for handling \$75,000 motor cars within two weeks after starting making its annual contracts July 1.

STANDARD GETS LLOYD PATENT

Cleveland, Ohio, July 20—The Standard Parts Co. has acquired the rights of the Lloyd patents covering the gas welding of tubing which will permit the company to extend considerably its tubing business.

Further Army Orders

Washington, D. C., July 22—The government's war order for 10,650 motor truck chassis last week, is evidently only a beginning. This is indicated by an announcement that the War Department has let contracts for 24,050 truck bodies—enough to equip more than twice as many chassis as have been called for.

Of the bodies the International Harvester Co. of Chicago, will build more than a third, its contract being for 10,000. Next largest is the contract of the Grand Rapids School Equipment Co. of Michigan, for 6400. The other awards are: London Auto Supply Co., Chicago, 900; Mulholland & Co., Dunkirk, N. Y., 500; Hercules Buggy Co., Evansville, Ind., 400; Theodore Kundt Co., Cleveland, Ohio, 550; G. W. Stratton Co., Defiance, Ohio, 1000; Eagle Wagon Works, Albany, N. Y., 1200; Continental Car Co., Louisville, Ky., 2000.

War Develops Electric

Lighter Vehicles Are Important in Delivery Service of Foreign Countries Now

London Uses Gas Bags to Run Trucks

LONDON, July 1—One of the newest developments in the motor field brought about by the present war is the great development in the use of electric vehicles for delivery service in city areas. This increased interest in electrics has been stimulated by the shortage and high price of gasoline and also by the fact that electric delivery vehicles can be handled much better by girls and boys who are doing this service than a more complicated gasoline delivery vehicle. It is impossible at this time to definitely forecast the possibilities of this turn toward the electric in city areas, but with the continuance of the war there is no doubt but that a very pronounced revival of the electric will be witnessed.

Another unusual war condition in the motor truck field is using gas bags on the tops of trucks for feeding the engine, this also being due to the shortage of gasoline. It has been found possible to furnish sufficient gas storage for a journey of 20 miles. In ordinary times the city government of London would not permit of carrying gas in this way and using it as a fuel, but under war conditions it is permitted. In normal times the gas could be secured in compressed form, but this is impractical at present because the use of compressed gases for more important works is so extended that it is impossible to get even the ordinary small gas tanks which have been used in the past for car lighting.

The cry among certain rabid British motor car manufacturers for absolute prohibition of American cars after the war is heard quite frequently now. The weight of the industry does not pay much attention to these misguided enthusiasts. The sentiment is general in London that these advocates of complete prohibition are defeating their own end by the extreme views of their arguments. Unquestionably the time from now until the end of the war will be occupied generally with the controversy between the rival British schools of free trade and protection as related to the motor industry.

400 AVIATORS AT SELFRIDGE FIELD

Mt. Clemens, Mich., July 20—Two units of the aerial service, the eighth and ninth squadrons of the signal corps, arrived at Selfridge Field from San Antonio, Tex., recently. These units, comprising 400 men, contain flying instructors, wireless operators, mechanics and all workers necessary in a flying camp. Technical work preparatory to the reception of the aviation cadets started yesterday morning. Additional army units for guard duty and for aviation service will arrive here shortly. It is expected by Aug. 1 the hangars

mess halls, barracks and countless other structures will have been painted and pavements will have been laid to do service as streets. Among the jobs nearing completion at the field is the construction of twelve hangars for airplanes, six barracks with a capacity for 150 men each, aerial repair shops, machine shops, truck garages, quartermaster's supply building, school building with six class rooms, hospital, officers' club, twelve mess halls and six buildings to quarter the commissioned officers and four to quarter the non-commissioned officers, administration building, blacksmith shop, water supply plant, power plant and fire protection plant. The hangars are 120 ft. long and have full width sliding doors, 66 ft. at each end to allow for the entrance and exit of airplanes.

CINCINNATI ENTRY BLANKS SOON

Cincinnati, Ohio, July 24—Entry blanks for the next race on the Sharonville board speedway, which will be designated as the Army and Navy Sweepstakes, will be mailed within the next few days, and as more than forty drivers already have requested information concerning the race which will be run on Labor Day, Sept. 3, it seems likely that there will be a large field facing the starter for the event.

The major race will be 200 miles, open to all cars qualifying at 90 m.p.h., or better, and in addition there will be several short races for non-professionals, one or more match races and a series of aviation exhibitions. It is expected that the winners of the five big races this year—Billy Taylor, Lewis Chevrolet, Earl Cooper, Ralph Mulford, and Ira Vail—will participate in this event, and the winner should be numbered among the five mentioned. Prize money for the main event will be \$10,000, split ten ways, \$4,000 going to the winner, and the other \$6,000 to be paid to finishers in this order: \$2,000, \$1,000, \$750, \$500, \$450, \$400, \$350, \$300, \$250.

THE WEEK'S RAISES

Indianapolis, Ind., July 20—After Aug. 1 the price of the Premier motor car will advance \$300, or from \$1,985 to \$2,285.

CHASE RAISES PRICE

Syracuse, N. Y., July 21—The Chase Motor Truck Co. announces an advance in price of its model O 3½-ton truck from \$3300 to \$3600.

HUPMOBILE ADDS \$100

Detroit, July 20—The Hupmobile has been increased \$100. The five-passenger touring, formerly \$1,285, is now \$1,385; seven-passenger touring, formerly \$1,440, \$1,540; sedan, formerly \$1,735, \$1,835.

SCRIPPS-BOOTH INCREASES PRICES

Detroit, July 20—The Scripps-Booth Corp. has increased prices of its four-cylinder three-passenger model from \$935 to \$1,250 and of its eight-cylinder four-passenger model from \$1,284 to \$1,425.

U.S. Motor Now Ready

Product of Country's Skill Produces Engine for Great Aircraft Fleet

Models of Foreign Make Aid in Design Here

WASHINGTON, D. C., July 21—The new motor built after weeks of intensive study and application, at a cost of \$300,000, and as a result of the combined knowledge and skill of the ablest scientific minds the country can produce, brought here to aid the Council of National Defense as members of different ones of its advisory bodies, is now ready for manufacture and use in the great aircraft fleet to be built by the United States government. Not only has the experience and technical knowledge of the engineers of this country been at the disposal of the Aircraft Production Board, but the practical experience in the field of war abroad and the scientific knowledge of engineers and army aviators from practically all of the allied nations of to-day have been drawn upon.

Models and actual parts of motors used in air machines in the service of the English, French, Italian and Russian armies have been brought to this country to be inspected and to be studied. The Italian government is now sending to this country what is said to be the largest airplane in the world, one which has been successfully used against the U-boats as well as against the Austrians on the Italian front. This great mechanical master of the air will be studied from every possible angle, aided by the knowledge of what it has accomplished or, perhaps, failed to accomplish.

U. S. Air War Assured

WASHINGTON, July 24—Special telegram.—Following the signing by the President of the aircraft appropriation bill, Howard E. Coffin issued a statement in which he said that while weeks and even months will be required for the design and construction of jigs, tools and gages, even with great effort, that preliminary work already done by the Aircraft Production board has made possible a considerable organization toward carrying out the aircraft program. He added:

"America is the last great reservoir of material for war products as well as for airplanes. In considering the size of the appropriation it must be remembered that less than half this amount is to be expended for airplanes alone. Personal training, equipment overseas, maintenance, spare parts, flying stations, armament and scientific apparatus all are to be provided for and are equally as important as the machines themselves."

ACCESSORY MEN CLOSE SUNDAY

Louisville, Ky., July 20—In line with a plan of some of the leading tire and accessory dealers in Louisville to close all such places on Sunday, Roy E. Warner, of the Roy E. Warner Co., a dealer, was fined in

a magistrate's court this week under an old statute against working on the Sabbath. The case was a friendly one. Mr. Warner was arrested on a warrant sworn to by Jess Frazier, manager of the Economy Auto Supply Co., who accused him of conducting business last Sunday. The prosecution contended that it was a violation of section 1321 of the Kentucky statutes. Mr. Warner was fined \$2 and costs.

The majority of tire dealers want to bring about Sunday closing and this case is their first step. It was intimated by the dealers interested that other fines might result for the same offense. They claim that the tire dealer and his employees are as much entitled to a holiday on Sunday as anyone else, and that suspension of Sunday service will not place any very great hardship on the public.

STUTZ EARNS \$8.29 A SHARE

New York, July 20—The Stutz Motor Car Co. of Indiana, the entire capital stock of which is owned by the Stutz Motor Co. of America, reports a net profit for the six months ended July 30 of \$621,775, or \$8.29 a share on the stock of the parent Stutz company. This earning power of \$8.29 a share for the six months period compares with the present annual dividend rate of \$5 a share. Six months' surplus this year of \$621,775 compares with a surplus of \$649,000 in the entire calendar year 1916.

OLDFIELD BREAKS RECORD

Providence, R. I., July 21—Oldfield won two out of three races from de Palma at the Narragansett Speedway to-day. Oldfield drove the Goldbug and de Palma the Packard Twelve. The 25-mile race went to Oldfield in 22:54¼ and the 10-mile also, in 8:14¼. De Palma took the 15-mile race in 13:51¼. Oldfield's time in the 10-mile race broke the track record of 9:02¼, made by de Palma in 1915 in the 100-mile sweepstakes event won by Rickenbacher.

CASTLE MARKETS C-H SHIFT

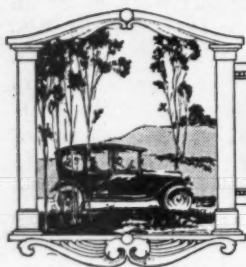
Detroit, Mich., July 20—Distribution of the Cutler-Hammer magnetic gearshift has been placed in the hands of the F. E. Castle Co., which takes over entire charge of the marketing of the gearshift throughout the United States. The C. H. shift was originally known as the Vulcan and is manufactured by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. It is now standard equipment on the Premier car and optional on others.

CHANDLER EARNS \$1,574,000

New York, July 20—The Chandler Motor Co. reports net earnings for the six months ended June 30 as \$1,574,000, comparing with \$863,000 for the same period of 1916. It is estimated that profits to Aug. 1 will equal \$26 a share on \$7,000,000 capital.

WHITE TRUCKS FOR FRANCE

New York, July 24—Special telegram—The White Co. has closed an order with the French government the first installment of which calls for 1500 trucks, the full order taking eighteen months to complete.



EDITORIAL PERSPECTIVES



Standard Military Trucks Assured

SUDDEN activity on the part of the quartermaster's department in the purchase of thousands of army trucks of commercial design without reference to the standard truck specifications for type A and type B chassis, may be taken to show that military authorities suddenly have awakened to the immediate need of motor transportation and the impossibility of getting sufficient number of trucks, unless some contracts are placed now. Until the announcement, somewhat unexpectedly, of the government's purchase of 10,000 trucks last week, the fear was growing among those in touch with the situation that the difficulties in agreeing upon proper changes from standard specifications, as developed by the quartermaster's department and the military truck committee of the S. A. E., might result in the government being sadly in need of a vast number of trucks even before they were ordered.

STANDARDIZATION as a principle in military equipment and in particular, as it applies to motor transportation in the army, has the enthusiastic approval of all classes affected by military transport contracts. The government forces, as represented by the general staff, the quartermaster's department, etc., the industry, as represented by the truck and parts manufacturers, are completely in accordance with the idea that efficiency in operation and maintenance will be greatly enhanced by standard specifications. Most of these classes, however, feel that the present emergency is such that for this year, at least, standardization will have to be sacrificed in order to obtain a sufficient supply of motor equipment at a time when it will be needed most.

IT is held that the quartermaster's department is proceeding along the right lines in buying the vehicles now as commercially produced in order to get them in quantities without delay,

and that meanwhile, the discussion of, and changes in, the standard specifications may go forward and manufacturers may get ready to build the standard truck at some later date. By next year, it may be assumed that the standard specifications will have been worked into shape, and manufacturers will have been tooled up and have the materials for quantity production of the government standard vehicle.

THE War Department has done right in putting aside funds to permit an absolutely standard military truck to be produced. Following the work done under the auspices of the S.A.E. the Quartermaster's Department will call engineers to Washington to complete designs for class A and B trucks in which everything to the last cotter pin will be standard. These trucks will be the best interpretation of the military specifications which the engineers of the industry are able to produce. The enormous increase in mobility given to an army by the possession of the last word in engineering in the shape of trucks, and the immense amount of delay avoided by having a minimum number of models to keep in repair cannot be overestimated.

WHILE our armies are being trained and equipped, there is time to get them better trucks than any other army has in the aggregate. There is time to profit to the full from the information which France and England have placed at the disposal of the War Department. In congratulating the Society of Automotive Engineers on having carried a great work far forward, still more congratulation is due to the authorities for taking over the work and putting it on an official basis. It means that the expeditionary army will not be confined to transport as good as that of its allies, but it will have the best transport that any army has ever had.

Paint Bridges White

ONE of the hazards of motoring at night is the difficulty of distinguishing such narrowing of the roadway as is caused by bridges and culverts. There have been many accidents caused by cars driven at a moderate pace striking the rails of a bridge or culvert, when the bridge is narrower than the normal roadway. Newton County, Indiana, has taken a step toward eliminating such accidents, which is well worth being widely followed. This is to paint white all bridges or the fences defining approach to them. This is carried out still further by defining the ends of the small culverts by a stout white rail on either side. Thus the motorist cannot get into difficulty by running one wheel off the end of a culvert which is

shorter than the width of the road. Sharp and dangerous turns, particularly where there is a ditch bank, have been protected in the same way. The white paint shows up in the light of the headlights, in plenty of time to warn the driver. In that county now, white paint means "Caution."

IF all roads have their dangerous spots defined in this way, or in some other easily distinguishable manner, lists of accidents would be shorter. Night accidents are not always caused by speeders. Quite frequently, they are the result of unexpected permanent obstructions or narrowing of the path without warning.

Carry Your Own


MOTORISTS, perhaps more than any other class, are in a position to subscribe thoroughly to the "Carry Your Own" campaign which the Commercial Economy board of the Council of National Defense is urging. The market-basket idea for many years has been a favorite with the motorist shopper, in many cities.

MOTORISTS in other cities have the opportunity to do their bit in one small particular if they will use their cars to carry home their purchases and thus save to the country's service transportation facilities now required for small deliveries.

Country Roads in the City

HIGHWAY improvement by state and counties has so far outdistanced road work within city limits, but beyond built-up districts, that it is not at all uncommon to ride in comfort over good roads for many miles and then encounter miserable entrances into a city.

IN many cases, the entire cost of the improvement is borne by the property abutting the road, whereas country roads usually are paid for by the entire town, sometimes with county and state aid. Probably the only remedy for this condition is to arrange the taxation so that it blankets all the section benefited.



Universal War Economy

"THE Bureau of Commerce has found that in the city of Washington it costs 7.4 per cent of the gross sales of food to pay for its delivery. On a food bill of about twelve and three-quarter million of dollars in 1916, Washington paid over \$900,000 for sending the stuff to the purchasers. Naturally it cost more to deliver some things than others. Ice, bread, milk, ice cream, cost Washington most. The report of the Commercial Realty Board declares that in our great cities the cost to the department store of delivering packages is from eight to twenty-five cents apiece. It is no uncommon thing for the cost of delivering an article to exceed the cost of the article, and probably one-half of the daily purchases of a department store might be carried home by the women themselves."—Ida M. Tarbell.

"IF the powers in Washington continue their investigations of the common practices of life we shall all of us very soon become very much ashamed of ourselves, ashamed of our easy acceptance of wasteful ways of doing things; ashamed of our lazy habit of letting others do for us what we might easily do for ourselves; ashamed of the intellectual shiftlessness which takes it for granted the way a thing is done must be 'all right' or at least 'good enough.'" This is the conviction of Miss Tarbell, whose statements with regard to war economy are timely. Continuing, she says:

"The same board which has rallied the women to cooperate in saving the wasted loaves, is calling on them now to co-operate in another saving—one vastly greater, one which if properly conducted will free not less than a hundred thousand men and a tremendous amount of equipment to be used where they are really needed.

"Just as in the case of bread, this new saving comes through a reform in one of the every-day practices of life—the way we get our daily groceries, meat, fruit, vegetables. They come to us almost like the Manna from Heaven. All you did in the case of Manna, I believe, was to pick it up; all we do in case of our groceries is to ask for them—ask for them at any hour of the day—a dozen times a day if we will—in any quantity, a box of matches, a half dozen bananas, a pound of steak, and presto it is put on the kitchen table.

"The Great Necessity on us demands a prompt, vigorous cutting out of the waste in all delivery of foods. I have spoken here only of food products, but we all know that what has been said applies equally to all sorts of shopping, and particularly to department stores. How is all this vast, unnecessary use of men and horses and trucks and money and time to be cut out and the delivery system put on a rational basis where it is strictly confined to what is necessary?

"There are not a few towns in the country where it has already been put on such a basis by co-operative deliveries. Ann Arbor, Mich., has had such a delivery conducted by its merchants for eight years. Formerly it took seventy wagons to carry home the daily buyings of the people—now it takes but eighteen. In other towns there has been a saving in cost of from 25 to 75 per cent. Wherever a co-operative delivery has been well managed the average saving has been around 50 per cent.

"Of course, this means a reform in the method of ordering. One delivery a day is all that ought to be expected under present conditions. If a woman knows that is all she will get she will quickly and easily reform her ways—or carry her extra bundles.

"The Woman's Committee of the Council of National Defense firmly believes that all that it is necessary to do today to secure hearty and prompt co-operation from women in carrying out such savings as this, that their fellow-committee on the Council of National Defense has demonstrated to be possible, is to let them know that it is asked. It urges women everywhere to aid in the reform. They can very properly encourage their merchants to establish central or co-operative deliveries and call on them to limit their deliveries to not over one a day on each route, cutting out accommodation deliveries altogether. They can discipline themselves to regular and thoughtful ordering. They can carry small packages. They can discontinue the wasteful practice of having goods sent home "on approval," which nearly always means waste effort in delivery as well as extra charges within the stores. In a certain department store with total annual sales of \$3,000,000 returned goods amount to 20 per cent, involving a waste of more than \$50,000 annually.

"Each woman will do her part if groups of women everywhere will spread the reasons why the Government through the Woman's Committee is making this request. There will be no doubt that we shall see 100,000 men freed from useless service. A package in the hand will then be as truly a badge of honor as a Red Cross button on a coat lapel.

"The Bureau of Commerce has found that in the city of Washington it costs 7.4 per cent of the gross sales of food to pay for its delivery. On a food bill of about twelve and three-quarter million of dollars in 1916, Washington paid over \$900,000 for sending the stuff to the purchasers. Naturally it cost more to deliver some things than others. Ice, bread, milk, ice cream, cost Washington most. The report of the Commercial Economy Board declared that in our great cities the cost of the department store of delivering packages is from eight to twenty-five cents apiece. It is no uncommon thing for the cost of delivering an article to exceed the cost of the article, and probably one-half of the daily purchases of a department store might be carried home by the women themselves."—Ida M. Tarbell.

To Ask Bids on Bodies

Ordnance Branch to Advertise for Prices on Supply and Repair Trucks

Specifications for Creepers, Caterpillars, Etc., Are Drawn

WASHINGTON, D. C., July 22—The ordnance branch of the War Department soon will advertise for bids for 1000 ammunition bodies, 700 supply trucks and 500 repair trucks. In addition, the ordnance branch will buy creepers, caterpillars, etc., for which specifications are now being drawn. The Holt tractor is to be favored as to this equipment, although the specifications will seek to standardize the parts as far as possible to the end that delay may be done away with in equipping the field artillery divisions.

The \$640,000,000 aircraft bill is now before the President for his signature, it having passed the Senate, as it did the House, without opposition on the final vote. It will revolutionize the airplane industry, and in anticipation of its passage, steps have been taken to rush work on it to the limit.

The administration food control bill, amended to prevent members of the Council of National Defense or its affiliated subcommittees from participating in the letting of government contracts for products in the manufacture of which they are interested, and also giving the president absolute authority over fuel and its products, specifically mentioning coal and petroleum, also has passed the Senate. Both of these big bills are now in conference and their final passage is expected soon.

GROUND SCHOOLS TRAIN FLIERS

Washington, D. C., July 21—Most of the 1142 "kindergarteners" in the aviation section of the Army are hard at work in the ground schools now in operation on college campuses throughout the country. The

course is one fathered by Major Hiram Bingham of the Aviation Division and endorsed by English and French fliers who have seen the work. The importance of the ground schools is that of a thorough technical training.

The idea is to give the student perched at the top of a ladder the picture of the Belgian battle ground as it would appear to one looking down from a height of 7000 ft. The student's perch is 16 ft. from the ground, and the picture covers a surface of 16 sq. ft. and has been drawn from aviation photography. The cadet works with the key of a radio outfit, which for convenience gives forth visible electric flashes governed by a standard code. The instructor stands at a switch board from which at will he flashes little electric lights on any part of the map. Taking note of these imaginary explosions the young aviator ticks off instructions to the "batteries."

The modern aviator is more than a flying man. He must know his machine and be familiar with all the tricks of riding it. So perfect becomes the communication between the modern aviator and the batteries that fire control from the air is now an exact science.

LEAVES PACKARD TEMPORARILY

Detroit, July 20—J. G. Vincent, vice-president of engineering, Packard Motor Car Co., has left the Packard company for the period of the war to give all his attention to aviation work in Washington. Mr. Vincent has been working with the Signal Corps.

McAENEY STILL WITH HUDSON

Detroit, July 18—W. J. McAeeny, factory superintendent of the Hudson Motor Car Co., is in Washington on advisory work in connection with production problems of the U. S. A. aviation engine. Reports that Mr. McAeeny has severed his connection with the Hudson company for the duration of the war are untrue. His trips to Washington are made from time to time as his advice on production matters becomes necessary.



This American trench digger at the officers' training camp at Fort Benjamin Harrison, Ind., is patterned after those in use by the French on the western front

May Restrict Driving

Curtailment of Fuel Use Possible as War Economy Measure

Country Now Using Current Supply and Drawing on Reserve

WASHINGTON, D. C., July 23—Motorists may have to curtail driving as a war economy measure to save gasoline. Economy in the use of gasoline is imperative if the government is to have the petroleum it will need to prosecute the war successfully. Sufficient gasoline should be available to provide for all the normal uses of motor cars, but it seems likely that pleasure riding will have to be curtailed.

In a warning to the American people, sounded by A. C. Bedford, president of the Standard Oil Co., it is urged that not a gallon of gasoline be used in the present emergency, except for some useful end. Mr. Bedford is chairman of the committee on petroleum of the advisory commission of the Council of National Defense.

According to Mr. Bedford, this country is producing crude oil at the rate of about 300,000,000 bbls. a year. The amount of crude oil in storage, all grades, May 1, 1917, was 165,688,797 bbls., therefore the country is absorbing the entire current production and drawing rapidly upon its reserve supply.

Demand for Fuel

In 1910 there were 400,000 motor cars in use in the United States, while to-day this number has increased approximately by 1000 per cent. The 4,000,000 cars in this country at present are demanding over 40,000,000 bbls. of gasoline a year, while other uses of gasoline and oil are expanding at an enormous rate.

Although there have been almost three times as many new wells drilled in 1917 as in 1915, the initial production is considerably less than in 1915. The drilling of wells is still going on, but thus far there has been no increase in production over last year or the year before.

It must not be assumed that the oil supply is diminishing sufficiently to cause alarm; there is oil to be had if producers in the oil business will re-double their efforts to get it out of the ground.

Mr. Bedford makes the statement that with proper economy on the part of the public, and with sufficient co-operation and effort on the part of oil producers, there should be ample to supply the needs of our government, of our allies of industry in this country, and for domestic use.

Chicago officials of the Standard Oil Co. of Indiana corroborate Mr. Bedford's statement.

MANNING FORETOLD WARNING

Washington, D. C., July 23—The warning as to fuel, given by A. C. Bradford of the Standard Oil Co., was not unexpected, for it was forecast about the first of June by Van H. Manning, director of the Bureau

of Mines, who drew attention to a decrease in production and an increase in use in an address before the editorial conference of business papers. At that time, however, oil experts stated that there is plenty of oil in the ground and that the only problem is to get it out. This has become increasingly difficult because of labor troubles and due to the rapidly mounting cost of supplies for drilling.

Manning states that the various oil fields in the Rocky Mountain region have a greater potential supply than is being utilized and that this is due almost entirely to lack of transportation facilities. California will produce 2,000,000 bbl. more than in 1916. The Appalachian field will increase production by 1,000,000 bbl. The North Texas fields will hold their own this year and may show an increase, though the Cardo field, and the Lima fields may show losses. It is expected that the Mid-Continental and Illinois fields will show decreases in production of 1,000,000 bbl. each.

It is understood that the principal object of the warning is to stimulate production. The warning is a corollary to others urging every loyal American citizen to conserve supplies of food, clothing and other necessities.

NEW AJAX TIRE RECORD

New York, July 24—Special telegram—The record of 37,482 miles has been reached by the winner of the fourth annual tire mileage contest of the Ajax Rubber Co. The winner is Fred Weitman of Brooklyn, N. Y., the first prize being \$500. An average of 15,000 was made by the first fifty winners. The second prize of \$300 was won by Joseph Schoenbaum of New York, who negotiated 33,072 miles; third prize of \$200, W. F. Trueman, who went 29,393 miles. This year's record compares with 27,220 last year and is better than 5000 miles over the 1915 record.

REPUBLIC RUBBER IN MERGER

Youngstown, Ohio, July 20—The Republic Rubber Co. has taken an option on the plant of the Knight Tire & Rubber Co., Canton, Ohio, as the preliminary step to a merger of the two companies in a new corporation with a capitalization of \$20,000,000. H. J. Woodward becomes general sales manager of the two companies. As soon as the merger is completed the manufacture of Republic tires will be carried on both in the Canton plant and in the Youngstown factory. The manufacture of Knight tires will be continued.

DECISION FOR WARD LEONARD

New York, July 20—Judge Charles M. Hough to-day sustained the patent infringement action pertaining to a method of controlling the output of an electric generator brought by H. Ward Leonard, Inc., against the Maxwell Motor Sales Co. in the United States District Court. The injunction granted was suspended to give the defendant opportunity to appeal. The claim is based on patents Nos. 1,157,011 and 1,122,774 awarded to H. Ward Leonard, now deceased. The invention was made in 1909, and application was filed Jan. 18, 1910.

Hal Makes Fast Time

Junk Pilots Twelve from Pittsburgh to Chicago in
15 Hr. 13 Min.

Averages 33.4 M.P.H.—150 Miles
of Bad Roads

CHICAGO, July 21—Driving a Hal-Twelve touring car from Pittsburgh to Chicago in 15 hr. 13 min., breaking all previous records between these two points, is the mark made by Fred Junk last Thursday. In making this 503-mile sunrise-to-sunset run Junk average 33.4 m.p.h. for the entire trip. This is a high average, considering that 150 miles of the road over which the run was made is unimproved dirt with five long detours. There are nineteen towns and cities through which he passed in which it was necessary for him to slow down as no arrangements had been made permitting him to exceed the speed limit within corporate limits.

This was not an officially sanctioned test, but the car is said to have been in no way altered, or especially equipped for the run. The Lincoln highway was closely followed all the way from Pittsburgh to Lima, Ohio. The route from Lima was through Van Wert, Goshen, South Bend, and Hammond. Newspaper men checked the car out of Pittsburgh and Chicago newspaper men checked it into Chicago. The object of the run was to demonstrate what a twelve-cylinder car of liberal dimensions could accomplish in case of military needs.

SPRINGFIELD BODY ELECTS

Detroit, July 19—B. F. Everitt has been elected president of the Springfield Body Co. of this city. He is president of Everitt Bros., also of this city. An entirely new directorate was appointed, consisting of E. W. Wagner, president of the E. W. Wagner Co., banker and broker of New York and Chicago; H. F. Tenney, president of the Syracuse Trust Co., Syracuse, N. Y.;

C. A. MacDonald, counsel of the E. W. Wagner Co.; Harry L. Bill, works manager of the Chalmers Motor Co.; E. W. McGookin, who has just resigned as sales manager of the Springfield company. G. W. Woods was elected secretary and treasurer. Mr. Woods is the head of the Springfield Realty Co., the concern which erected the \$1,000,000 body factory just completed in Detroit for the Springfield company. New capital will probably be brought into the concern, but nothing definite will take place on this until after July 27, when a stockholders' meeting will be held in New York City.

TO CONSIDER TRACTORS

New York, July 20—A special tractor meeting of the Society of Automotive Engineers will be held in Fremont, Neb., during the week of tractor demonstrations which begin Aug. 6 and end Aug. 10. Aug. 8 has been selected as S. A. E. day at the demonstrations.

Arnold P. Yerkes, head of the farm management division in the Department of Agriculture, will read a paper on the wider and more efficient use of tractors on the farm. Mr. Yerkes conducted the two questionnaires which have gone to more than 35,000 farmers now using tractors and is familiar with all the information in the answers to these. A. C. Bennett, president of Wilcox-Bennett Carburetor Co., Minneapolis, Minn., will read a paper on Kerosene versus Gasoline as a Tractor Fuel.

MITCHELL BUYS WAGON PLANT

Racine, Wis., July 21—The Mitchell Motors Corporation, Racine, Wis., has purchased the plant of the Mitchell Wagon Co., Racine, which has disposed of all patterns, trade-marks, stocks, patents and good will to Deere & Co., Moline, Ill. The Mitchell Motors will use the big wagon works for the manufacture of bodies and coach work. When the former Mitchell-Lewis Motor Co. was purchased by the present owners and re-named the Mitchell Motors Corp., the wagon department was organized separately. The wagon works, however, manufactured some Mitchell bodies for the parent company.



These new French armored motor cars equipped with periscopes served as advance guard when entering in a newly conquered German sector in the Aisne

Rickenbacher

PARIS, July 4—Eddie Rickenbacher, U. S. A. soldier, is obtaining his first real experience of military life in French barracks, shared with French soldiers and sailors. Rickenbacher sailed with General Pershing's staff, and for a short time was entrusted with the task of driving the American general in France. He is now a sergeant in the signal corps, driving a Hudson car, but expects in a very short time to receive a commission and take up flying at one of the American schools in France.

Rickenbacher, who declares that he is now getting used to military regulations and discipline, has had good opportunities since his arrival here of becoming acquainted with the motor transport and aviation work of the French army. He expresses his admiration of the fine motors and the huge quantity production of the leading French factories. At Porte Maillot, the motor car center of Paris, the American driver soon came in con-



U. S. A. Soldier

tact with all the leading figures of French racing, and found that although he had not previously been to France, he was well known to all Frenchmen interested in racing. In this district he met some of his old competitors on Indianapolis and other American tracks, among them being Arthur Duray, who is now in the motor service of the French army; Jean Chassagne and Rene Thomas, who, although in civilian clothes, are mobilized in the French airplane motor factories.

Howard Marmon is expected in Paris shortly at the head of the industrial mission. He has been preceded by Mr. Hughes, who is assisting him in this work, and who was for a few years on the Packard staff in Paris. General Pershing's staff of army chauffeurs, Jennings, Limthicum, Brain and Middleton, are now in Paris. It is stated that George Robertson will arrive here shortly in the capacity of soldier in the U. S. army.

From Chicago to Kentucky and Virginia

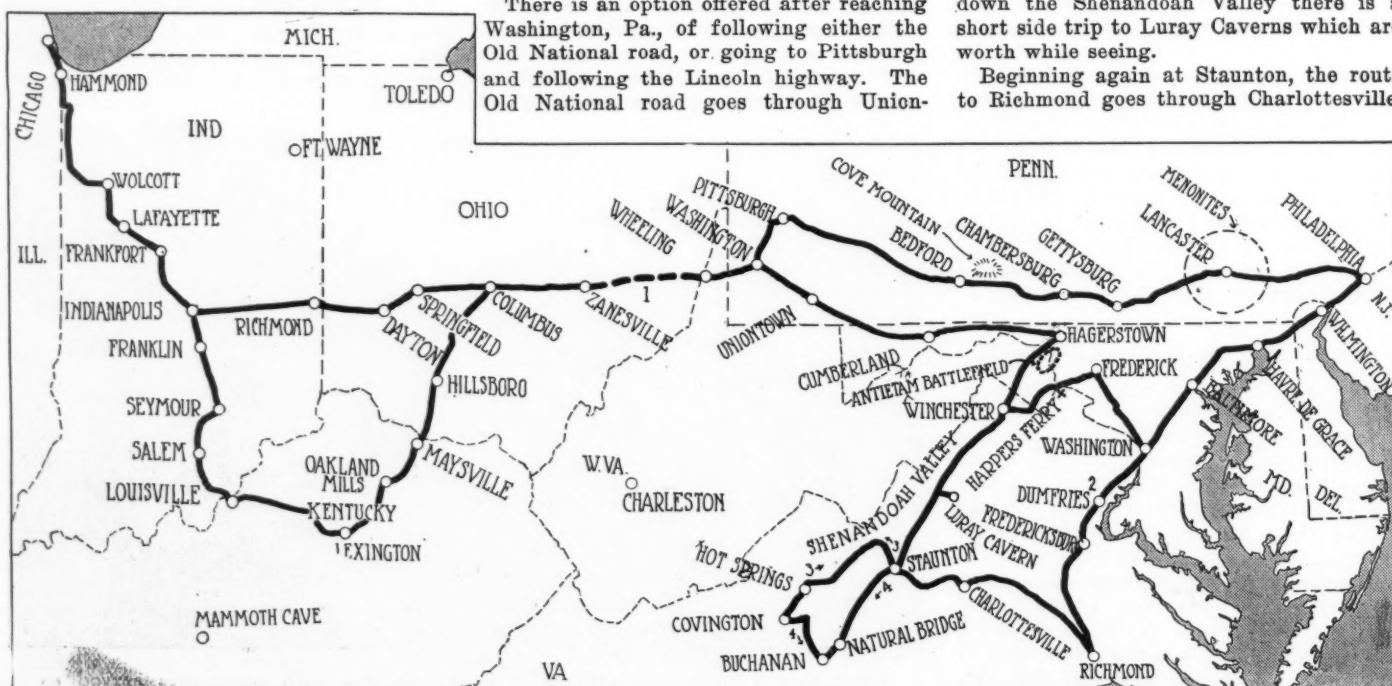
LAST week MOTOR AGE outlined the best routes between the principal New England cities and this week shows the best arteries of travel from the Middle West to the Blue Grass section of Kentucky and through the Shenandoah Valley and other historic sections of the Virginias. Starting from Chicago, the route followed is the same as that given in the first of this series of weekly road pointers, going through Morocco, Ind., La Fayette, Frankfort and Lebanon to Indianapolis. For

those wishing to reach the Virginias without touching the Blue Grass section, the road through Richmond, Dayton, Springfield, Columbus, Zanesville and Wheeling should be followed. There is some rough road between Zanesville and Wheeling and one day must be given to this particular part of the route. All of the road up to Zanesville is good brick or macadam, and from Wheeling on it is all good macadam, brick or concrete except as will be noted later.

There is an option offered after reaching Washington, Pa., of following either the Old National road, or going to Pittsburgh and following the Lincoln highway. The Old National road goes through Union-

town and Cumberland to Hagerstown. A turn to the southwest through the Shenandoah Valley is made, the towns en route being Martinsburg, Winchester, Middletown, Harrisonburg and Staunton. From Staunton there is a loop that is mostly dirt road by which one may reach Hot Springs, Covington, Buchanan, Natural Bridge, Lexington and return to Staunton. The 47 miles between Staunton and Hot Springs is good in dry weather but difficult when wet. Before reaching Staunton while coming down the Shenandoah Valley there is a short side trip to Luray Caverns which are worth while seeing.

Beginning again at Staunton, the route to Richmond goes through Charlottesville,



Best routes from Middle West to Blue Grass section and Shenandoah Valley and other historic sections

and Montpelier. Parts of this road are bad when wet. For the return trip from Richmond, the route goes through Fredericksburg, Dumfries, and Alexandria to Washington. In the vicinity of Dumfries there is a 14-mile stretch that is very rough and almost impassable when wet. From Washington the return trip may be made over practically the same road by using the cut-off between Washington and Winchester, going via Frederick, Md., or going north through Baltimore, Bel Air, Havre de Grace, and Wilmington to Philadelphia, all of which is good macadam. From Philadelphia west to Pittsburgh, go through Downingtown, Lancaster, in the vicinity of which are the Menonites, Gettysburg, Cove Mountain, which offers a very interesting road, Bedford, and Greensburg. From Pittsburgh go to Washington, and join the National Road, returning the same way across Ohio.

Practically all of the Kentucky Blue Grass section may be reached by going south from Indianapolis through Columbus, Seymour and Salem, to Louisville, and thence east through Shelbyville, Frankfort, Lexington and Paris to Maysville. Here cross the Ohio River by ferry, driving north through Hillsboro and Washington Court House to Columbus.

PATHFINDER REFINANCES

Indianapolis, Ind., July 24—The Pathfinder Motor Co. of America has been incorporated in Delaware to manufacture motor cars, trucks and engines. There is \$2,000,000 for preferred stock, and common of no par value. The Pathfinder company was recapitalized four months ago for \$5,000,000. W. E. Stalnaker, vice-president and director of sales, is giving up his duties with the concern to serve his country as an officer of the Indiana National Guard.

PLANE TO CARRY FORTY

New York, July 20—Italian scientists have designed and have under construction a plane of 3000 hp., capable of carrying forty persons, according to Major Terfetti of the Royal Italian Flying Corps in an address last night at the Automobile Club of America. The Italian army, he declared, now has an airplane which makes 139 m.p.h., a seaplane making 112 m.p.h. and an airplane measuring 100 ft. from tip to tip. All the planes used by the Italian army are constructed from raw material shipped to Italy from America.

GOVERNMENT SPEEDS ROAD WORK

Washington, D. C., July 20—The linking up directly of the good roads question with the use of motor apparatus is emphasized in action just taken by the War Department to the effect that this department will railroad cars and other needed equipment to contractors engaged in building an 11-mile link of highway through Boone County, Kentucky.

This link is a part of the Dixie highway and is an important chain of communication between Fort Thomas, Ky., across from Cincinnati, and the big National Army cantonment being constructed at Louisville. When the cantonment is completed transportation between it and Fort Thomas will be of the greatest importance.

The Mayor Kept on Milking

by W. K. Gibbs



With apologies to James Thomas Fields' "And the Barber Kept on Shaving."

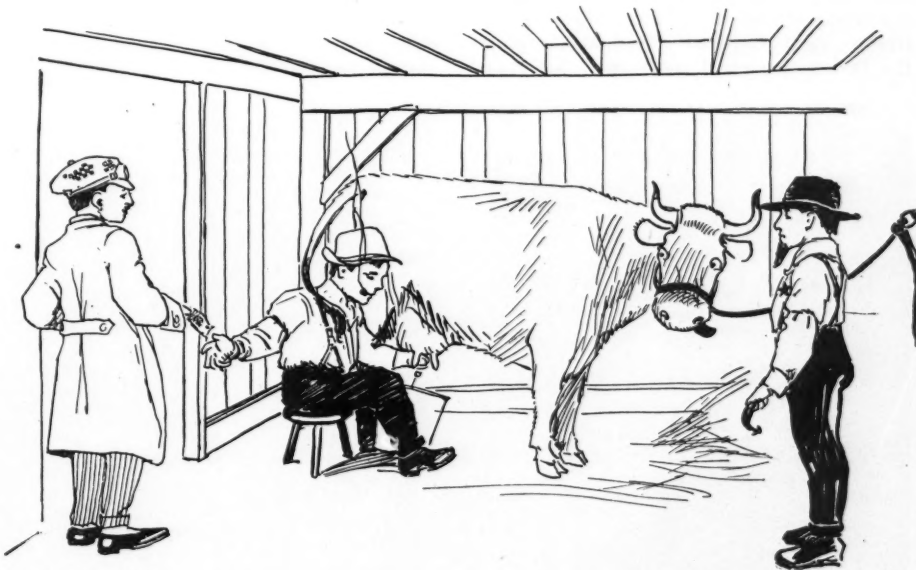
July 4 was celebrated in Thornton, Ill., by the arrest of numerous motorists who failed to drive to the right of a "dummy policeman," supposed to mark the center of the two main street intersections, but which was placed so far off center that many did not notice it. This is the tale of the thirty-second offender whose case was heard in the mayor's barn while the city's chief executive separated the lacteal fluid from a peaceful member of the bovine herd.

Multitudinous voices rent the air: startled, the motorist stopped; Simultaneously, on the running board, the cheery sheriff hopped. Amused, the populace, hovered 'bout; 'twas a day of revel for them; They eagerly watched the motorist, whom the sheriff soon would condemn. "See that post!" the sheriff barked; the motorist said he did. "Then why didn't ye drive around it with your speeding katydid? Better drive up to the mayor's house and see what he has to say, You're the thirty-second feller I've taken up there today." The Mrs. Mayor said the chief was out in the stable, she 'lowed. 'Twas there they found him milking, though seemingly little cowed. "Another case, Mr. Mayor," said the sheriff, shining his star. "Let's get this over," the culprit chirped as he stood before the bar—

AND THE MAYOR KEPT ON MILKING.

"What's the charge?" asked the mayor—lacteal foam rose in the pail—"Disregarding an officer, sir, and he ought to be in jail." "Look here," said the motorist, "you should pay a good old U. S. V For making me late for dinner, instead of me paying a fee." "Can't do it, young man," said the sheriff, "we're here to administer law, But we might let you off with a dollar and call the thing a draw." The motorist pondered; he'd driven far; was dry and wanted a drink Of old-fashioned buttermilk, rich and thick, he gave the sheriff a wink, Then bargained for drink along with his fine, got it, drew forth a bill Which the judge-court-jury, one hand free, deposited in pocket-till—

AND THE MAYOR KEPT ON MILKING.



It is said the construction of National Army cantonments and National Guard training camps in various sections will mean beyond any doubt the construction either entirely by the government, or with government aid, of tens of thousands of miles of good highway additional to that already built. From 200 to 400 miles of

fine roadway will be necessary in and around each of the sixteen cantonments now going up, and these roadways will not take into account those necessary to bring about proper connections between the cantonments or the training camps for guardsmen and government depots or stations in various directions from each of these.

U. S. A. Standard Military Truck Certain

Major Drake of Q. M. Department Notifies Truck and Parts Makers at Columbus Meeting that Purchases of Commercial Types Are Only Temporary—Regulation Vehicle to be in Production in Few Months

SECRETARY OF WAR BAKER has approved the appropriation of a large sum to enable the Quartermaster Department to complete the design of standard class A and class B military motor trucks and to build and test experimental trucks of perhaps several alternative designs. Meanwhile trucks will be purchased sufficient for the army's needs from the old line manufacturers, the war department taking commercial vehicles from a small number of makers, so as to keep the number of models as small as possible.

A number of engineers from parts makers and truck companies have volunteered their services to go to Washington and work for the government till the job is completed. From the list given to Captain Britton selection will be made, and when the design is finished a large number of men will be called to come and criticise it. Then the sample vehicles will be built with all speed, tested and approved or improved.

When the standard design is found satisfactory enough to be made final the war department will use it exclusively in ordering further supplies of trucks. They will open bids for so many class A or class B trucks for the supply of which anyone may tender. The trucks will bear no makers' name; they will be just military trucks, precisely as a gun carriage is just a gun carriage, whoever makes it.

These important facts were announced at a great gathering of the truck industry, both engineering and commercial, at Columbus, Ohio, July 20. Major C. B. Drake and Captain Britton, both of the Quartermaster Department, the major

By A. Ludlow Clayden

representing the purchasing office and the captain the mechanical branch, explained the situation, stating the army's scheme with a completeness which has not before been possible.

It is still uncertain how many trucks will be needed in total. It is still uncertain how many soldiers will be needed; but whatever the number, the war department is satisfied that the time which must be taken to raise a large continental army and to train it and get it across the ocean, will be at least as great as the time necessary to complete the production of a military truck which will be better suited to its work than any commercial truck in the world.

No Interference with Production

At the Columbus meeting, spokesmen for a number of manufacturers pleaded that there be no interference with present production, pending the completion of the standard truck; and the assurance was given that there would be no such interference. That the immediate needs of the army must be met with trucks as now being built is not questioned for a moment. It was also asserted by a few manufacturers that the repeat orders from the allies for their commercial product was proof of that product's correctness and that therefore there was no need for the "standard military truck."

This Captain Britton replied to very fully. He pointed out that the repeat orders were not given because the trucks were ideal, but because the enormous task

of maintenance absolutely prohibited any change; the trucks could not be changed even to improve them. America, however, has time to avoid the confusion attendant upon a multiplicity of designs.

Again, it was pointed out that England had tried to produce a standard truck in 1915 and failed, with a great loss of time as the result. To this, the answer is that England tried to do it at a time when the fullest capacity of the British truck factories was required to be in production upon trucks; that the attempts to produce the standard truck played havoc with the normal routine of the factories. America is not planning to evolve a standard truck at a time when all the truck and parts plants are filled to capacity with government orders.

The standard design will be proved and finished before great quantities of trucks need to be ordered. At the start of the war England had to have any trucks she could get, suitable or unsuitable; America is in no such state of stress and can therefore get something better suited to military work than anything the Allies have.

Another criticism offered was that the standard specifications call for a vehicle which is needlessly strong. It was suggested that Mexican experience was taken too much into consideration, that the European roads where our army is to work are vastly superior to anything on the border. In answer to this Captain Britton asked: "Is the front in France going to remain where it is for all time?" or are our troops going to advance? "We must and shall advance and when we do so the country over



Notable gathering of truck men at Columbus, Ohio, in which the government committed itself to the standard military truck for the Quartermaster Department of the United States Army—Interchangeable to the last cotter pin

which we will have to go is such as to make the Mexican roads appear as boulevards." For such advance trucks cannot have too much power or be too strong.

The Captain's speech, which was a long one, ended with immense applause. It was the exposition of the government's plan for which the truck industry has been waiting, it showed a clear, well-defined scheme, it showed what was to be done and how to do it. Subsequent speakers supported the scheme strongly. A few doubted the time that would be taken in completing the sample trucks, but the general opinion is that that the very early Fall will see them on the road at the latest.

Hitherto the standardizing work aimed at assisting the production of interchangeable units such as engines, transmissions, etc., for assembled military trucks have proceeded under the auspices of the Society of Automotive Engineers, that body having been called upon by the war department to assist. From now on the work becomes purely army work. The engineers who have volunteered, and whose services will be enlisted, are to be paid for their time. What was unofficial before now becomes official in the fullest sense of the word. The funds provided are ample for the purpose; the work will be done with as great a speed as in the case of the aviation engine which will be the U. S. standard.

Drawings Nearly Ready

There were well over 200 present at the Columbus meeting, scarcely a truck manufacturer or parts maker in the industry failing to be represented, and mostly by both the engineer and the president or general manager. It was a completely representative meeting, all sides of the question having full and free hearing. After the general discussions, committee groups formed for the detail discussion of the design of the class B truck. It is announced that much larger quantities of class B will probably be needed than of class A, the lighter truck. The transmission is well toward completion, and final drawings will be ready this week. The engine is in a less advanced state. In axles probably both worm and internal-gear types will be built, and possibly a double-reduction one too,

the type adopted being settled by the tests of the sample machines. Many other details are well forward. It is expected to call the engineers to Washington during the present week and then to go right ahead till the job is completed.

TEXAS TAX IS OPPOSED

Austin, Tex., July 20—It will probably be some time before all the kinks are taken out of the new State Highway Commission law. The case of its constitutionality is now before the higher court. The particular point involved in this suit is the validity of that provision of the law which imposes a registration fee or license tax on motor cars and other vehicles. The suit is that of P. S. Atkins of Austin against Curtis Hancock, chairman, and other members of the state highway commission. Judge George Calhoun of the district court here has rendered a decision refusing to grant an injunction to plaintiff to restrain the collection of the license tax. The appeal was taken to the Court of Civil Appeals. Judge Calhoun held that in passing this law the legislature acted within its legislative powers and there is nothing in the act repugnant to the constitution; that it is one of the functions of the government to establish and maintain public roads, "and that over said roads the state by and through the legislature has absolute control," and may rightfully prescribe uniform regulations necessary for public safety and also charge a graduated fee for the registration of motor vehicles. The court held also that the legislature was acting within the police power of the state in the enactment of the law.

A. A. T. A. WILL GET YOU

Lincoln, Ill., July 16—The Anti-Automobile Thief Association has been organized in Lincoln. Twelve men, owning powerful motor cars have been enrolled and they agree to respond at a moment's notice to trail motor car thieves. When a report is received of a stolen car, each man will start out on one of twelve roads allotted to

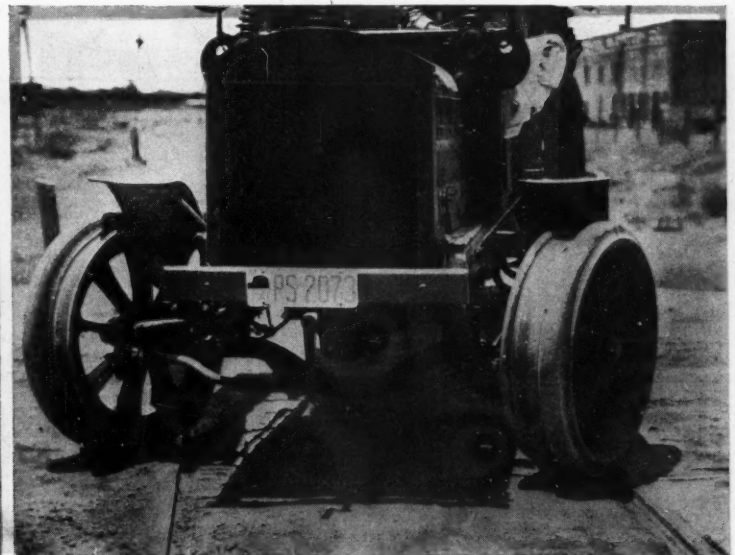
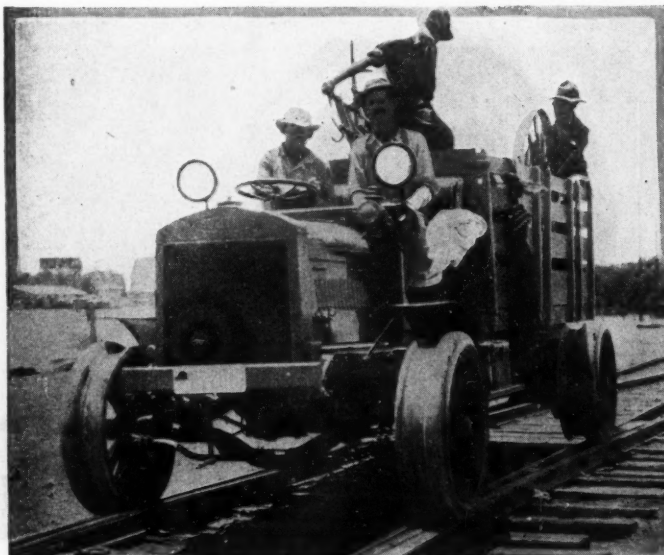
him and will drive a hundred miles or more, if necessary, seeking clues concerning the missing car and thief. Any report concerning the route of the stolen car will be telephoned to the sheriff and that officer will advise all of the other drivers who are on the trail to close in towards the direction taken by the driver of the stolen car. By reducing the roundup to a carefully arranged system, the chances of overhauling the thief are greatly increased, while the thorough organization will have a tendency to discourage the operations of joy riders and car thieves generally.

MUCH SPUDS; MANY CARS

Fort Fairfield, Me., July 14—Motor cars are getting to be so thick in Aroostook county, the big potato pelt, that the owners when they go out at night now expect that their headlights will lure deer and moose into the highways, as the animals used to be coaxed with jack lights in past years until a law was passed prohibiting this sort of hunting.

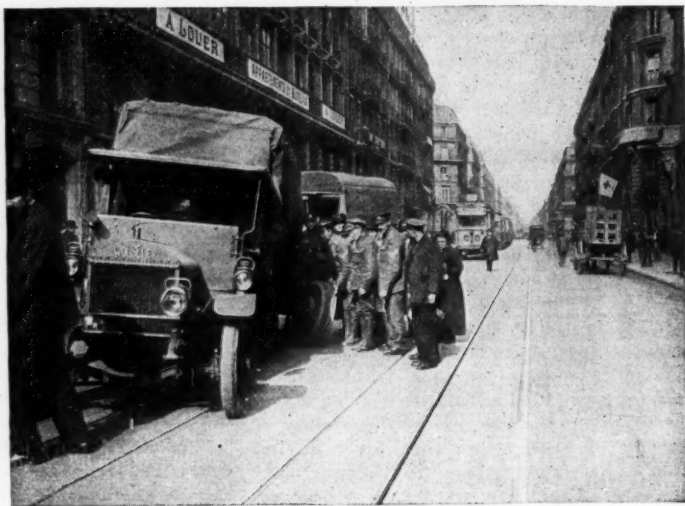
In Fort Fairfield alone, where there are some 10,000 people, there are now more than 1,100 cars registered. And the potato growers have not stopped buying yet. They have bought big cars, too, although the small ones are in the majority. If the buying rivalry continues there will be more large, expensive cars than smaller machines.

The farmers have disposed of the 1916 potato crop of some 17,000,000 bushels, for which they got about \$28,000,000. The average price per barrel of 2½ bushels was about \$4.12, while some brought as high as \$12, and many sold for \$8. While some 40,000 acres were planted last year about 60,000 will be planted this season, a 50 per cent increase. Another big crop is assured, and even if the price should drop to \$3 or \$4 a barrel it will mean plenty of money for the farmers, for it is considerably higher than a normal price.



The United States Government is interested in this latest invention as troops and supplies can be transported by it on highways and railroad tracks. The wheel has a solid rubber tire with a regulation railroad flange

Shells Go Forth, Their Mark to Make



Above—Six men aboard this light truck were killed outright by a German shell

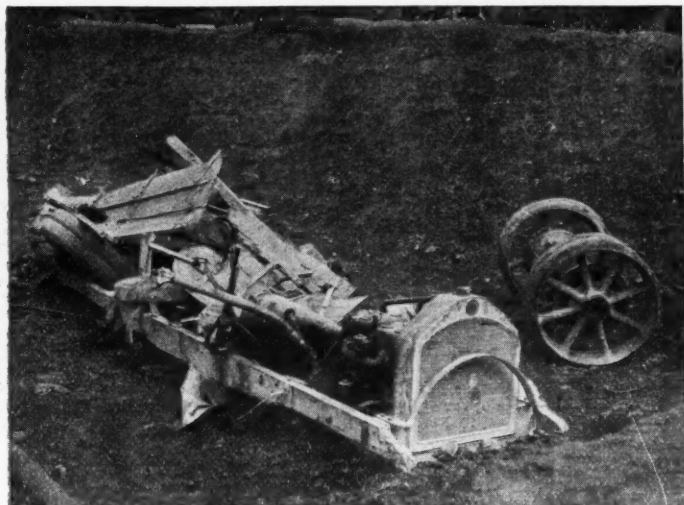


Above—A British army truck in difficulties in Paris draws a crowd of curious



Above—Road scene on the Champagne front in France. Left—Putting a bogey under a wrecked army touring car. Right—Military breakdown gang bringing home a wrecked car on a light bogey

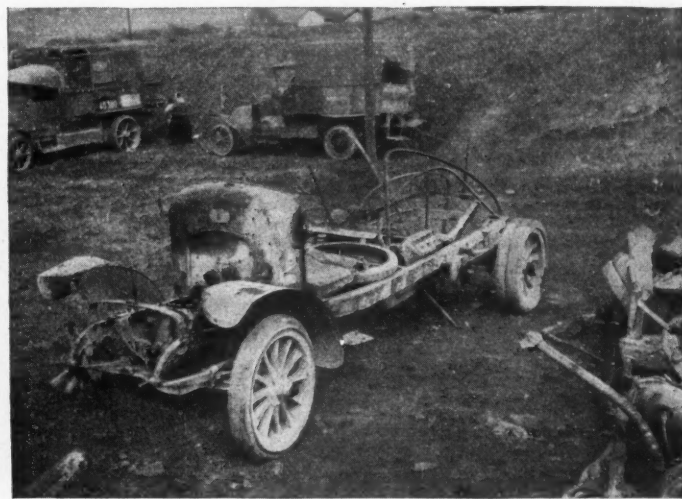
Leaving Wreckage in Their Wake



Above — War wreckage after a big battle in France. The roads are lined with such damaged machines



Above—Idlers are interested in the way American ambulance drivers make quick tire changes



Above—Results of German bombardment of the city of Rheims. Left—Both French and German war wreckage are found here. Right—Delahaye truck after it was hit by a shell

Why Coaching Days Are Not Over



The coaches climb the switchbacks of the scenic Ridge road and take a 30-mile coast down the other side

Californian Motor Stages Smack of Bret Harte, Salomy Jane and Other Immortals

MOTOR stage coaching in luxury has become the order of the day in Southern California. Having placed an order for \$80,000 worth of twelve-cylinder Packards and accepted delivery of eight cars, the El Dorado Stage Co. has been organized in Los Angeles and has begun operation. The stage company is capitalized at \$175,000 and the eventual plans of the organization are to extend the service of the line over practically all the main highways of the state, though now operation is restricted to between Los Angeles and Bakersfield and Los Angeles and Santa Barbara. It is 127 miles between the first two points and about 104 miles between the latter two.

Naming Is Novel

A novel and interesting feature of the new stage line is the naming of the individual cars. Because the new method of transportation harks back to the "days of old, the days of gold," when the stage coach was the only means of travel, the El Dorado stage managers have tried to heighten this effect by naming their cars after the men who did most to immortalize the West and the characters and places about which they wrote. "Bret Harte" and "Mark Twain" will lead the fleet. Other names already selected are "Yuba Bill," "Mountain Jimmy," "Salomy Jane," "Roaring Camp," "Calaveras," "Tuolumne," "Truthful James," "Poker Dick," "Fiddlin' Joe" and others of immortal memory. All the kings of the gold field rush days are to be remembered in this way.

The seating arrangement of the new cars is a departure from the usual Packard arrangement. Instead of the regular auxiliary seats, a deeply upholstered seat which has a removable middle section to provide access to the rear seat has been installed.

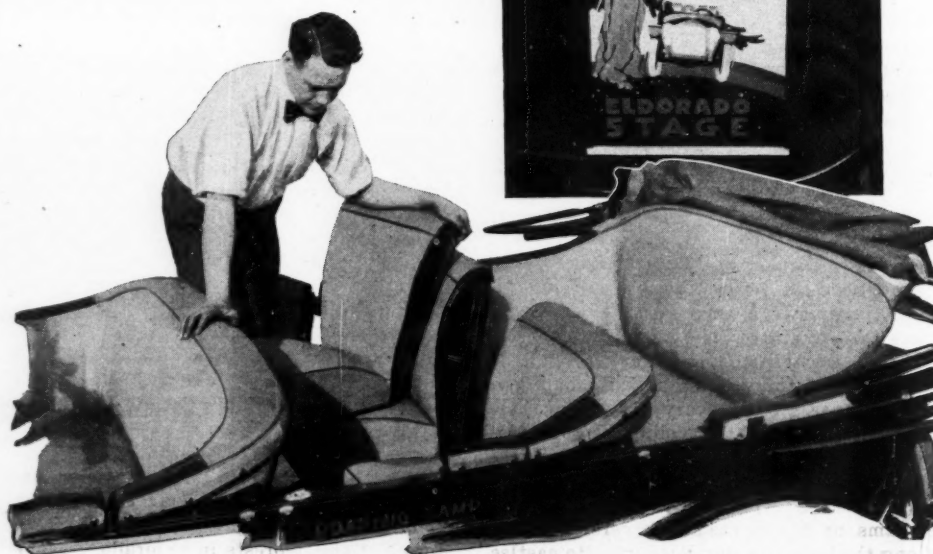
The cars will accommodate with ease eight passengers each in addition to the drivers.

N. M. LICENSES 11,500 CARS

Santa Fe, N. M., July 20—During the fiscal year ended June 30 there were issued a total of 11,500 motor car licenses. The total revenue derived by the state from this source during the year was about \$70,000.

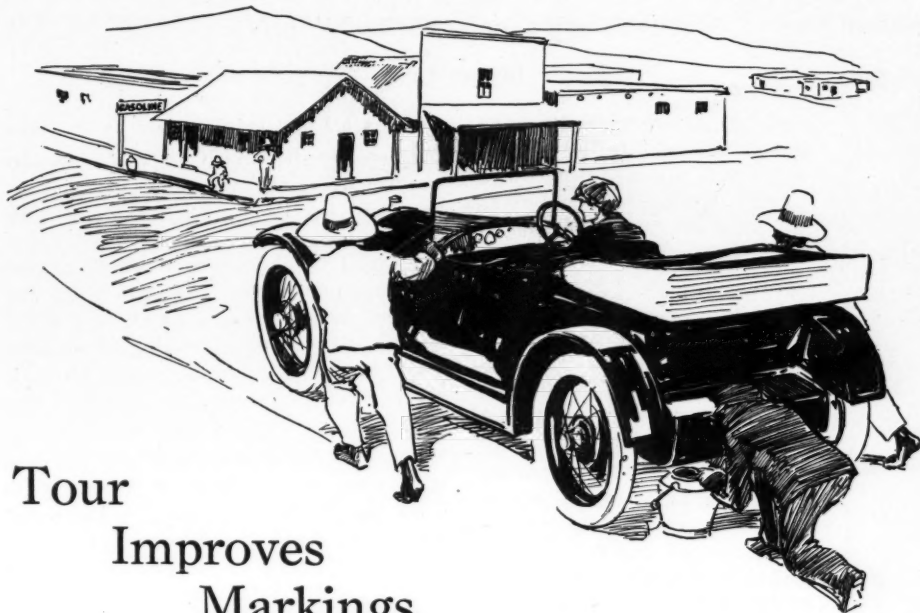
According to reports of dealers the prospects are favorable for an unusually large business this summer and fall. The number of orders which are being placed exceed that of any previous time of this year. Although dry farming in the eastern part of the state has been carried on in the face of an unusually severe drouth recent rains

make the prospects of a good crop of feed-stuff being obtained very favorable. In the irrigated districts large yields of various kinds of field products assured. The copper and other mines are being operated on a larger scale than ever before and the high prices that are obtained for the metals is causing unprecedented prosperity in mining circles. The strikes which have affected some of the larger mining concerns of Arizona have not been felt in this state.



How "Roaring Camp" and "Mark Twain" and their fellow-coaches provide room for nine by a different kind of auxiliary seat. The coat-of-arms of each coach is similar to the "Mark Twain" shown

Can't Drive Cars Into Mexico; Push 'Em



Tour Improves Markings

SALT LAKE CITY, Utah, July 21—Exactly on schedule time, the official inspection tour party of the Pike's Peak Ocean-to-Ocean Highway Association arrived in Salt Lake City at noon yesterday. Four days were taken in making the drive of 609.7 miles from Colorado Springs, at the eastern gateway to the Rockies, to the Capitol of Utah, the object of the party being not to set a speed record, but to travel at a pace which might be maintained by the average touring car, visit with the people along the way, make an official log, secure photographs and give some attention to the matter of marking the highway.

All along the way there were evidences of improvements that have been made within the last two or three years, plans for greater development in the near future, and indications that better accommodations are to be provided for the touring public.

Good and Passable

The road is not perfect, but at the present time it is a good, passable highway. Ninety per cent of the mileage between Colorado Springs and Salt Lake City is improved and ranges from fairly good to excellent roads. Of the other 10 per cent, there are short stretches here and there that require attention, while the longest stretch of poor road is in the sparsely settled district just east of the Utah-Colorado state line. Deducting time for stops, the party averaged nearly 18 m.p.h. running time for the entire distance.

From the scenic standpoint, the ride is truly wonderful. There is no monotony, no sameness. Nearly every mile brings new and varied views. Traveling through the depths of rugged canyons, crossing thickly-wooded sections, skirting the rims of mighty cliffs, following rippling trout streams or broad rushing rivers, winding along the base of many-hued granite castles towering to the sky, following down fertile green valleys with enchanting vistas now and then of far-stretching alfalfa, hay and

potato fields, passing sandstone rocks carved by nature into strange shapes, emerging from a desert country into a veritable Garden of Eden, winding down beautiful valleys and catching glimpses of snow-capped peaks in the distance—these are the pictures that unfold in picturesque variety as the tourist proceeds westward on his journey over the Pike's Peak Ocean-to-Ocean highway.

One of the objects of the trip has been to improve the marking of the highways. The national specifications of the association require red and white bands, each 10 in. in width at crossroads, forks and at frequent intervals between. At many places in the mountains, telephone or even fence posts are not available, and here it has been the practice to paint the two-colored stripe on rocks or trees, in order that the traveler in a strange land may have the feeling that he is on the right road. A striking design in red and white has been adopted and 1500 enamelled steel signs, 14 by 20 in. have been secured.

One of the features of the trip was the placing by President C. F. Adams of one of these steel markers on the highest point on the highway between Philadelphia and San Francisco—on the top of Tennessee Pass, just west of Leadville, Colo., where the road ascends by a 4 per cent grade to "the top of the world," 10,200 ft. above sea level, nearly 2 miles higher than its terminus at either end of the continent. Another steel marker was placed at the Colorado-Utah State line. At other conspicuous places the name "Pike's Peak Ocean-to-Ocean Highway" has been painted in red or white on rocks.

In connection with the marking, particular attention should be called to the splendid work that is being done by the forestry officials in the Pike, Leadville and Holy Cross National Forests in Colorado. A very complete and comprehensive plan of marking has been adopted, and boards neatly painted in green and white have been

If you contemplate going into business and that business is the retailing of gasoline, and if you have not decided where to locate this new business venture here's a tip. Make it at the most popular crossing on the Mexican side of the Rio Grande, for, in the parlance of Postum, "there's a reason." The Mexican government, in order to turn the tide of gasoline prices downward, recently removed the import tax on gasoline and almost at the same time President Wilson placed an embargo on the exportation of gasoline to neutral countries. Now, not only will the move of the Mexican government be defeated but prices of gasoline in border cities are likely to go considerably higher.

Enforcement of the embargo is rigid, so rigid in fact, that motor cars are not permitted to cross the international bridges at Rio Grande border points without first having the gasoline tanks drained. In this condition they are pushed across the international line where a new supply of fuel must be obtained. For the motorist who neither speaks nor understands Spanish the query: "Habla usted espanol?" need cause him no misapprehension—the Mexican gasoline vendor will understand that every car coming across the boundary will need gasoline and the motorist can make his wants known in the universal language—signs.

made, an appropriate idea being carried out in using pictures of fallen trees for arrows. These signs, which are now being placed on the main highways through these forests, are of great help to strangers and are another indication of the policy of the Forestry Service to make the national forests the recreation grounds for the people.

The present tour which extends from Colorado Springs to San Francisco, 1600 miles, is a continuation of the tour starting from the eastern states July 2 to bring the national officers and delegates to the midsummer meeting which was held at Colorado Springs, in Crystal Park and on top of Pike's Peak, July 10 and 11. At this meeting, the report of the committee on western extension was submitted and the Overland trail was adopted as the Nevada division. President C. F. Adams and Publicity Agent Harry W. Graham of Chillicothe, Mo., and Secretary-treasurer Alva W. Henderson of Colorado Springs, were authorized to continue an official inspection trip to complete the western extension.

To Continue Westward

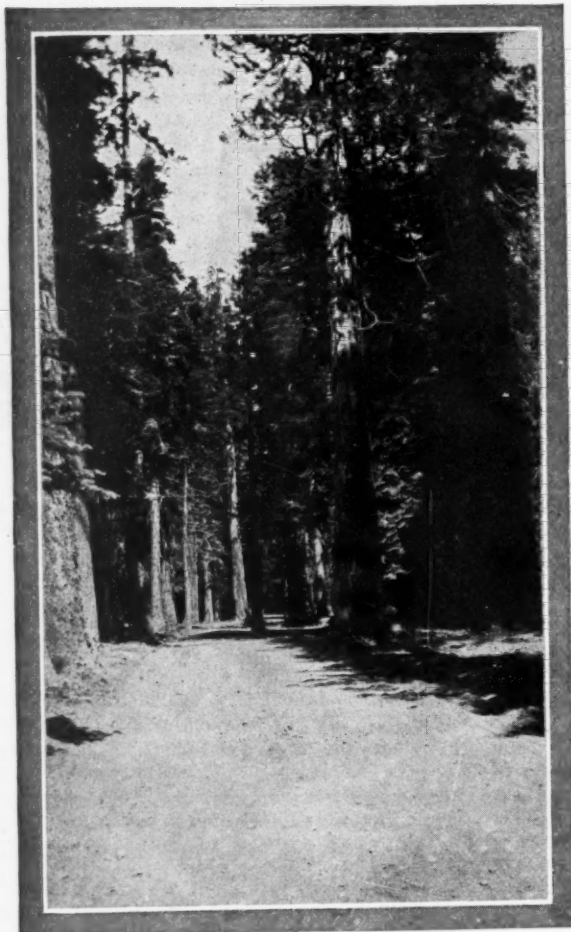
After attending the state good roads convention at Salt Lake City to-day, the official party will continue its journey westward via Ogden and the north-of-the-lake route connecting with the Overland trail at the Nevada-Utah line.

The exact route through California is not fully determined, and a meeting will be held at San Francisco at the close of the tour, when conference will be held with representatives of various available routes, and decision made as to the exact route between Reno and San Francisco or Oakland. This meeting will be held on July 30 at the rooms of the San Francisco Chamber of Commerce.

Across the Continent in a Ford

By Grace Laura Shelley

In Two Parts—Part II



California has plenty of motor drives.
This one is near the tavern on Lake
Tahoe

AFTER spending a few days in visiting the many places of interest in and about Salt Lake City I was ready and anxious to continue the tour over what I had been warned was a most perilous desert country. After adding to my equipment the

necessary desert water bags and rations sufficient to last several days and accompanied by a young woman friend, who proved a wonderfully congenial and useful tourist companion, I faced the unknown perils of the Great American Desert.

In crossing Utah and Nevada one should not fail to carry several days' provisions, an extra 5-gal. can of gasoline, oil and water galore. I may also suggest the advisability of having such extra parts of the car as are apt to be needed for replacement, though usually the part broken is entirely unlooked and unprepared for. In this respect the one and the only advantage I found in driving a Ford across country is that usually any part required may be obtained at the nearest garage, while others have to send either to Chicago or San Francisco. One must depend entirely on the courtesy of fellow tourists to procure and send back by other tourists such articles as may be required, as there are no telephone, telegraph, mail or express stations for the travelers' convenience.

There were awaiting me at the express office at Ely, Nev., two new tires shipped from Chicago, so I was under the natural impression that one new extra should see me through from Salt Lake to Ely, 291 miles. Between these two points there are no villages, only occasional ranches where gasoline and oil and some-

thing meals and lodging may be obtained.

We left Salt Lake City with complete equipment. Nothing one could think of had been overlooked. The first 50 miles out are over hard and fairly good roads, running into the natural winding sand highways of the desert, through Skull Valley and Indian farms. At Orr's ranch I was made to realize something as to desert prices of gasoline and oil, paying 50 cents a gallon for the former.

For twenty miles before reaching Fish Springs we found an exceedingly bad road with deep ruts, making it necessary to drive slowly. Through this stretch we met misfortune again in the way of two blow-outs but managed to reach Fish Springs by 9 at night, short one tire for the remaining 143 miles to Ely, a rather dismal outlook!

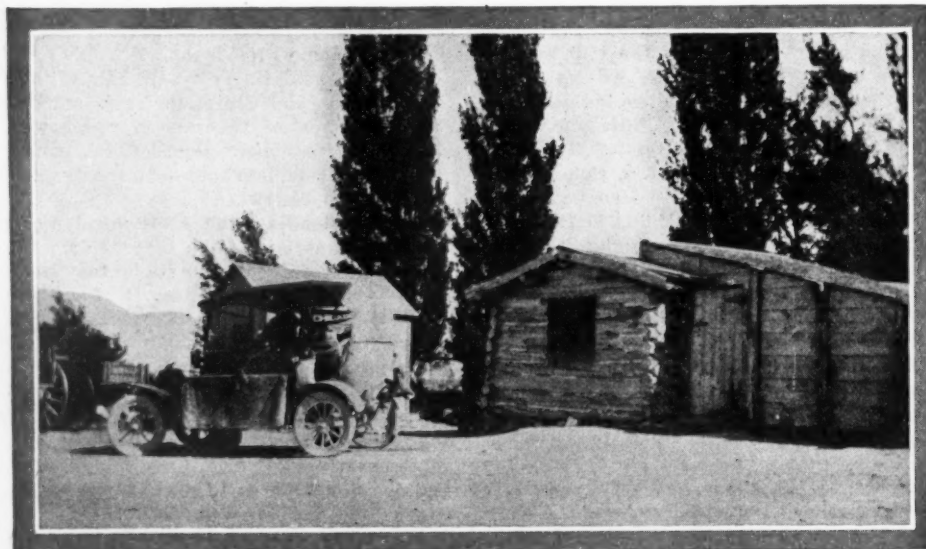
Gasoline 60 per

We were awakened early and partook of a bounteous breakfast served by Mine Host Thomas himself, owner of this very interesting ranch. The low, long white-washed adobe I found a relic of frontier days, it having been constructed in the early fifties, at which time it was used as an important trading station, and having at one time housed no less great personages than Horace Greeley and Mark Twain. That Fish Springs is now a truly modern enterprise was impressed on me when I was asked to pay my gasoline bill at the rate of 60 cents per, the highest price found on the desert.

Among other tourists who spent the night here I found one from whom I was able to procure a much needed tire, so I was early on the road in company with two other cars of tourists, a Ford and a Pierce-Arrow, the latter also having its engine troubles.

To make strong the advisability of tourists carrying ample provisions across the desert, no matter how much confidence they may have in the perfection of their car, I might detail briefly the inconvenience endured by passengers in the Pierce. They left Salt Lake City without provisions, expecting to reach Fish Springs during the afternoon. Engine trouble forced them to spend 24 hrs. of extreme heat in the day and cold at night without food or water. A westbound car a few miles ahead of us found them in this predicament. The head of the party, an elderly woman, was actually in tears from want of food and water.

The first 20 miles out of Fish Springs were over rough winding roads, up a long grade, and every minute we prayed that



Orr's ranch and 60-cents-a-gallon gasoline!

And it's 50 miles to the next water station, too



American River canyon between Phillip's and Placerville, Cal., is gorgeous. Phillip's has an attractive mountain resort, and the wonderful California highways start at Placerville

our troubles might be ended and that we should not be disappointed in reaching Ely that day. Our Ford and Pierce-Arrow friends were ahead and just when all seemed well, suddenly at a dangerous part of the road—a 15-ft. drop at one side and a steep sandy hill on the other—my steering-wheel was wrenched from my grasp, the car turned deliberately from the road and started to climb the hill, only stopping at a perilous angle.

I had long since learned to take as a joke and make light of anything that might happen, and at this time, though I scarcely dared breathe for fear the car might roll over, I was convulsed to see the predicament of my companion, who with camera strap over one arm and canteen strap over the other arm, rolled out of the seat, through the open door and down the embankment, fortunately more scared than harmed. Just why the camera and canteen on this downward trip she did not explain.

Car Has Freakish Turn

We found it necessary to use the spade to right the car. Somehow I could not discover the cause of our trouble. The wheels seemed to be perfectly straight, but we went only a few yards before the steering-wheel again was wrenched from my hands. I managed to stop the engine in time to avoid what might have been a serious accident. Again we righted the car, and this time I discovered the cause of all these freakish antics to be a broken radius rod. Of course, that was beyond my power to remedy, and we started camp, not knowing how long we might have to remain there until a new rod could be sent out from Ely, 100 miles west. At this moment our hearts were gladdened by the return of our tourist friends, who had missed us from the ranks, and with their assistance we managed to creep into Ibapah, 10 miles away.

Right here I want to impress on all Ford tourists that they should never attempt

driving over the middle and western states without an added rod to reinforce the radius rod. This can be done at a reasonable price of \$2.50. By taking this precaution fatal accidents may be avoided, for when a radius rod is broken there is no possible means of controlling your car.

We had to wait three days for the part. Other tourists helped us install it, and we started off again. Schellbourne pass proved extremely steep. The road was narrow and continually winding, making me drive down the grade on low gear and against compression. Before half way down the entire transmission was completely worn out—low, reverse and brake. To my consternation I discovered my emergency brake also failed to work, leaving nothing to do but devote my entire attention to the wheel, coast and trust to the Almighty for reaching the foot of the pass without careening over the precipice while making some of the short turns at a speed gaining every foot. At last, after a few minutes—seemingly hours—we landed safely, and with a level 40 miles ahead of us, drove

into the enterprising little mining town of Ely, on high gear.

While awaiting here the installation of new transmission bands I talked with tourists who had just come over the Lincoln highway from Reno, complaining of the terrible condition of the road and advising a detour by Tonopah. I finally decided on this route.

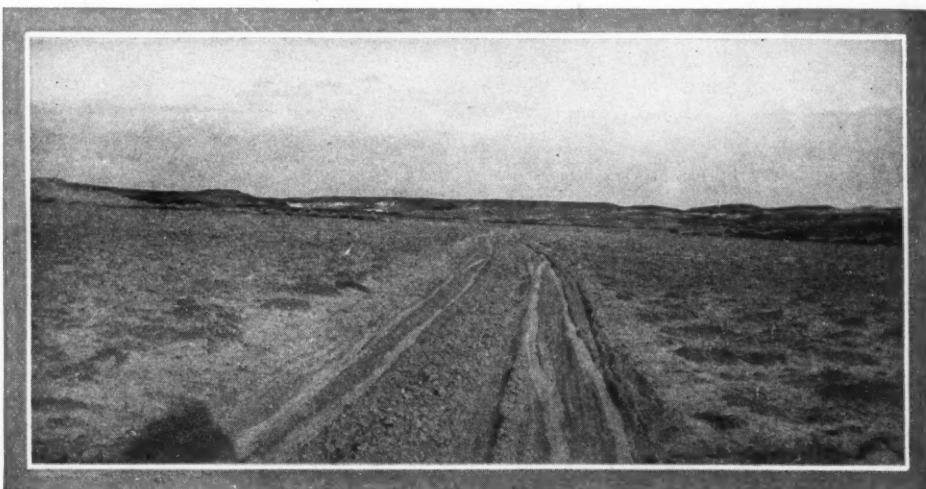
Hot Water to Order

We had been having our share of troubles, but they were not to be compared with those which followed. A few miles out of Ely we abandoned the red-white-and-blue of the Lincoln highway for the yellow and black posts of the Midland trail, following this to Horton's ranch; then by way of the Hot Creek route, camping near Lock's ranch, by a natural hot stream in the very heart of a dry barren portion of the desert.

The next morning we started beautifully, as usual, and only 6 miles away the engine stopped dead still. I spent an hour investigating, trying various remedies, to no avail. Three different cars came along, someone from each also working with me for hours through the hottest day experienced, until it seemed I could give almost anything I possessed for something cold. Toward evening I corrected one of the troubles, the timer, and we were able to get a few miles farther up the grade and into Black Rock canyon, where we camped for the night. Eight miles that day! Grand.

The next morning I continued work on the engine, performing every trick I had ever heard of with the spark plugs, wiring and carbureter, finally draining from the crankcase what I discovered to be excess oil, which had completely fouled the plugs. Simple? Yes, but it is always the simple matters that cause the big troubles, I have learned.

After getting under way the engine never worked better, taking the grades with ease. On arrival at Hot Creek ranch, 25 miles westward, we were greeted with joy by the woman residing there and the tourists stopping over. They had heard through others of our trouble, actually



The Lincoln highway leads through the Red desert through endless sand and dry leafless sage with occasional hills of barren sand

worrying about us and just about ready to drive out to our rescue. Thus you will find the true sympathy and good fellowship manifested by tourists in general and the whole-souled people who live at these desolate corners of the world. I loved them right away and inwardly felt ashamed to think of the concern of these strangers for us, when it had not occurred to me to worry, feeling that we would get out somehow.

Onward we rushed, hoping to reach Tonopah that night, but this is really what happened: Twenty-five miles from Hot creek, while cutting out 30 miles an hour, there came the sickening hiss of a punctured tire. Without a word my companion reached for the jack and I for the tire tools. You see our lesson was well learned by now. Methodically we applied a brand new tire, I started the engine while my companion walked around the car, hesitated, then quietly observed:

"Grace, I believe this front tire is flat."

Too Many Jokes

By this time I almost failed to see the joke, but patiently set to work on No. 2. Another 10 miles along perfectly beautiful hard smooth roads—a blowout. This was too much! I drove a couple of miles on a flat tire to a delightful camping ground near a stream of hot water gushing picturesquely from a mountain side. The early part of the night was so warm we left off the side-curtains, preferring to sleep in the open. Suddenly a terrific storm broke over us, with blinding lightning, driving rain and hail and a ferociously strong wind.

We had no time to put up curtains but resorted to pinning up robes for protection from the blasts. These, however, did no good. The storm kept up all night, and we nearly froze. In the early hours I crawled out, intent on making a fire, proceeded to dress quickly and with ax in hand set out to chop sage brush roots, the



Filling the water bags at Anderson's ranch, 47 miles west of Ibapah, a very necessary job on a transcontinental trip

only fuel available. Directly I heard my companion demanding of me, in none too pleasant tone, what had been done with her clothes? It occurred to me that I must have hers on, but, what had become of mine? On looking around I discovered one article neatly wrapped about a sage brush, another about another bush, where the wind had deposited them during the night. Also I discovered various items of our camping outfit strewn about.

After a hot breakfast I set to work repairing four punctures and a blowout. At noon the stage was all set, ready to go. Horrors! The electric starter balked and we could not start the engine. The rest of the afternoon we spent in an attitude of listening for the friendly hum of an approaching car, and when in hailing distance would meekly inquire:

"Do you know anything about a Ford?"

No one seemed to, though several attempted aid. As time wore on I began to feel the necessity of spending another

night here and was getting frightfully cold, so I really had to do something myself. After some little time I succeeded in changing over the wiring from the magneto to the battery, after which the engine started and we were again off at 9 at night, closely in the wake of another tourist who said he knew the road into Tonopah and suggested that he would keep but a little ahead of us.

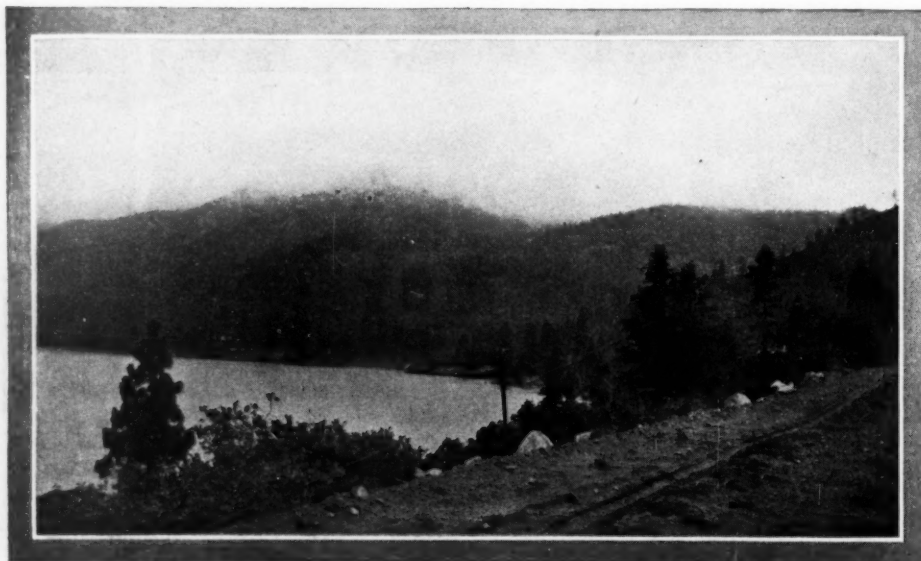
We had 55 miles to go so drove fast. Twenty miles were covered without even a puncture. Then, half way up a grade the engine stopped, out of fuel. Directly our protector came back to see what had happened. After a fresh supply from his spare can we proceeded another mile when we felt a most blood-curdling thump, thump, as though both rear wheels had suddenly disappeared.

Always the Unexpected

I was prepared for anything except what really happened. I climbed out, and what I saw struck me as the queerest thing I ever experienced. I stood there in the dark with my flash turned on the part gone wrong and laughed. Anyway, I am quite sure the man thought my intelligence had taken leave when he came back the second time and witnessed my unaccountable mirth. The demountable rim and tire had slipped somehow and turned at right angles with the wheel, resulting in that jolting thud. This matter cleared, we again proceeded Tonopahward.

From a point 20 miles from town one can look across the flats and see the lights of Tonopah. At this juncture we were in ecstasy, for we could almost feel the welcoming luxury of a real bed in a regular hotel, but then we were quite unconscious of another bomb yet to be exploded.

There had been a cloudburst the night before and for 10 miles the flats were one great lake to be forded. I shall never forget the terrible strain of that night drive, with water to the hubs, for to get off from



A regular motor car road leads for several miles around Lake Tahoe in California

the roadbed spelled disaster. The annoying thing about it was that I succeeded in accomplishing nearly the whole 10 miles. Within a half-mile of terra firma the car skidded into deep soft sand, to get out of which was an impossibility. Our friend ahead advised that at that hour, 11 o'clock, we leave the car and drive into town with him, which we did. I sent out in the morning and had the car brought into the garage, while we devoted the day to baths and rest, and baths again.

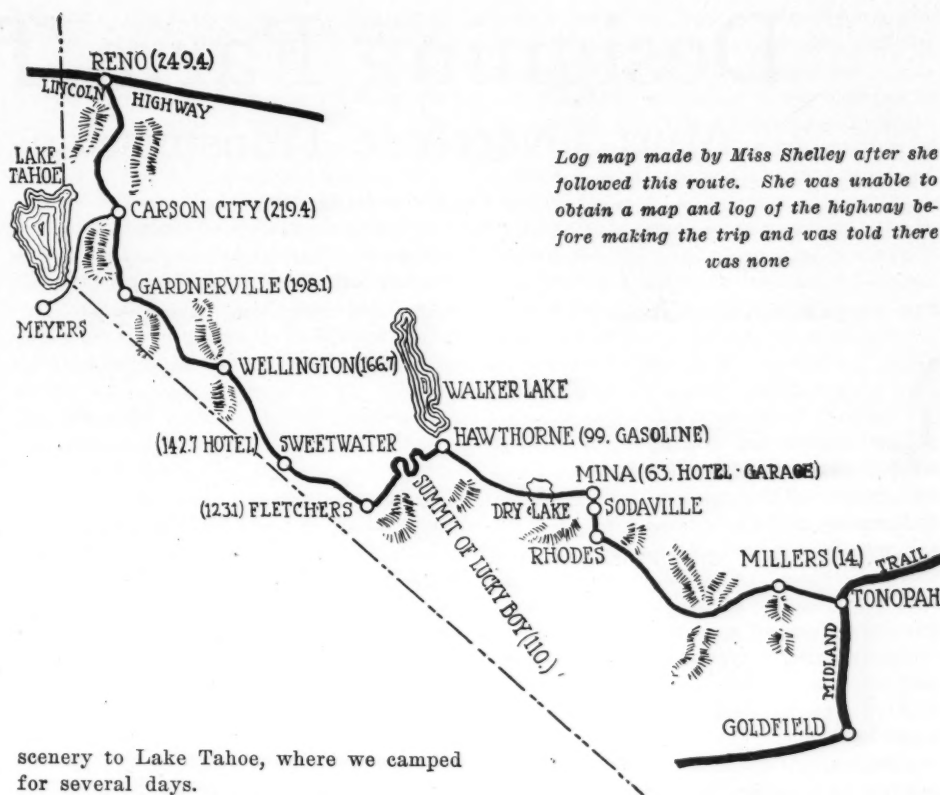
I consulted with Mr. Moore of the Nevada State Automobile Association for information about roads which we were advised to take from Tonopah to Reno, and I was surprised to find him unable to furnish a map and log of the highway, though he kindly explained the best way. This being the case I decided that in the interest of fellow tourists I would log it as accurately as I could.

We had something more than 200 miles to cover. Profiting by past experience, we replenished supplies to cover several days' requirements. We selected a perfectly beautiful day and after paying a \$48 garage bill, naturally supposed our engine trouble was over. However, after a trifling 10-mile drive we had two blowouts within a half-hour, which fortunately happened alongside a railroad. We decided to camp here. An electric handcar manned by several Mexicans came along and we hailed them. After some difficulty in making them understand my predicament, they consented to take me into town, where I procured a new tire and was driven back.

Climbing 9 Miles

The next morning we drove 2 miles farther to Miller's, where we were shown through the mammoth smelting plant. From this point for several miles through the flats the road was rough and we encountered a steady grade through the desert for 100 miles to Hawthorne, where we were able to replenish our gasoline supply. From Hawthorne to the foot of the Lucky Boy Summit is more sandy grade, after which we faced a steady 9-mile climb over hard, smooth and winding roads, all of which was necessarily made on low. In looking ahead at our goal, at an angle of 80 deg., we hadn't the slightest idea of ever being able to make it. In this, however, we were agreeably surprised, and at the summit our wonderful view for miles and miles across a vast desert valley at the right and Walker lake at the left amply repaid us for the nervous strain endured while making this perilous ascent.

From here through Fletcher's and the Sweetwater valley into Wellington the road was practically down grade. To Reno we found a perfectly smooth, hard road through picturesque valleys and canyons. From Reno we crossed the state line into California, ascending the long Dog Valley grade, thence through the pines over hard smooth roads to Truckee, from which point we traversed the 13 miles of picturesque



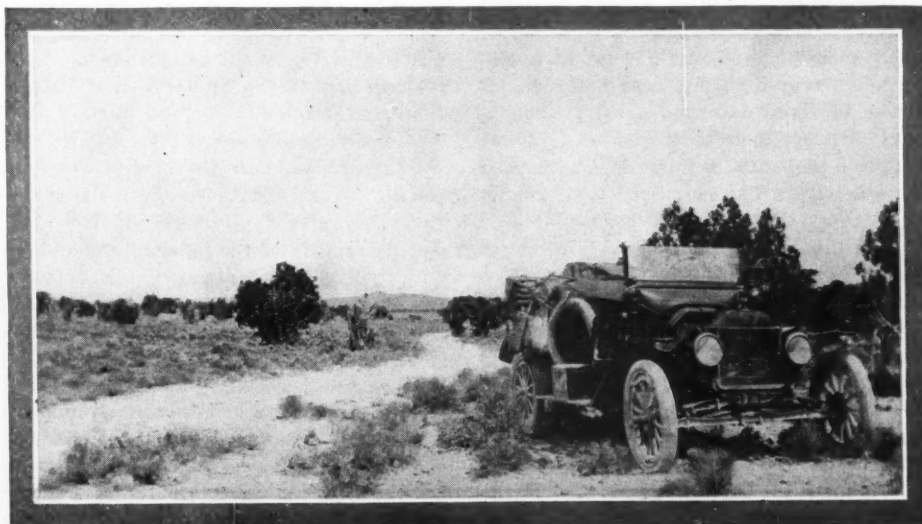
scenery to Lake Tahoe, where we camped for several days.

As for the beauty and grandeur about this wonderful lake I will confess inability to picture it in mere words. Any tourist driving to the Pacific coast will make the mistake of his life if he does not include this beauty spot in his tour. From our camp near the Tavern we followed the motor road along the shore for several miles, again taking up the Lincoln highway at Meyer's station. We previously were advised of the splendid food to be had at this point, but it was late in the afternoon when we arrived and, anxious to make the summit before dark, gave up the pleasure of stopping over. The summit was attained successfully. We reached an altitude of 7394 ft., and 2 miles farther on we spent the night at Phillip's station, an attractive mountain resort. From this place we traveled through the gorgeous

American river canyon, and at Placerville came in contact with the much-heard-of wonderful California highways, which removed all road troubles. We drove into San Francisco at noon, warmly greeted by the entire Market street traffic squad.

FLINT OPEN AIR SHOW

Flint, Mich., July 20—Beginning July 23, the Flint dealers will hold a 5-day open air motorcar show at Lakeside Park. Both new and used cars will be exhibited. Each used car will be examined by a technical committee from the dealers' association, and will be exhibited with the selling price attached. The show is preceded by an advertising campaign and "buy your car" week.



Near Current Creek summit on the Midland trail. Here the Ford is 45 miles southwest of Ely, Nev., and at an altitude of 7300 ft.

Designing Farm Tractors

Must Overcome Transmission Inefficiency

This is the last of a series of articles dealing with the problems to be overcome in producing the vast quantity of tractors essential for increasing the world's food supply. The first article pointed out that a big market awaits a good tractor, that the engine is the principal unit, and that it is not possible to set a definite price limit. The second dealt with engine problems and how heavy fuel will affect design in the future. The third was a consideration of the different layouts of wheels and other forms of drive.

IF there is to-day such a thing as an average transmission system for tractors it would be composed of a clutch, a two-speed and reverse sliding gear, a bevel gear and differential, and an exposed gear drive on the rear wheels, a bull-ring gear as it is commonly called. There is evidence in the drafting rooms of several tractor factories just now that efforts are being made to inclose the ring gear, but it is an extremely difficult job, so difficult to do efficiently that it may be questioned whether it is worth while.

Alternatively there is the possibility of driving the wheels through the axles, motor car fashion, this necessitating an extra train of gears within the transmission, and such gears will have to support a heavy tooth load. Yet again there is the worm gear to be considered, and the planetary gear, which can be constructed to give a great speed reduction.

While it is not at present a popular form of drive, there is a great deal to be said in favor of the worm gear. The aim is to waste as little power as possible between the engine and the wheels, and usually about 40 per cent vanishes in the transmission. A worm gear can be made the most efficient gear reducer if the circumstances of its use are satisfactory and if the reduction required is large, but it does not follow that the worm drive should be the final drive.

Possibilities of Worm Gear

Worm-gear efficiency, despite the frequent publications of the protagonists of the Lanchester and straight types, is still largely wrapped in mystery; but one fact seems to stand out very clearly, which is that efficiency is greatest when the rubbing speed of the worm is fairly high. Thus, if a worm with a ten-to-one reduction is about the largest that can be accommodated in the machine, it might conceivably be better placed at the engine end of the transmission than at the axle end. A possible layout would be to have the worm wheel and two sliding spur gears on one shaft mounted in an extension of the axle case; other gears on the differential cage could be meshed with the sliding ones to give the two speeds. Everything would thus come in a common oil bath, just as it does in the case of existing machines with the transmission and worm or bevel gear combined, but the opposite way around.

Probably time will show that the exposed ring gear is the most practical way of getting enough reduction for large-wheeled tractors and that the fully inclosed drive is best for the smaller machines, where the smaller wheel permits a less intense reduction in the transmission.

A very important point enters here, which is that the high-speed tractor ought to be more efficient than the slow-moving one. Suppose, for example, we have an engine which is powerful enough to pull two plows at four miles, or four plows at two miles an hour. Obviously, the gear reduction necessary to run at the higher speed will be just half that required for the slow speed, if the engine runs at a constant rate. While a twenty-five-to-one reduction is not twice as efficient as a fifty-to-one, it is, other things being equal, an appreciable per cent more efficient.

Disadvantage of High-Speed Machine

Now, against this argument there is the fact that the high-speed machine, pulling half the number of bottoms, will have to drive itself twice as far for a given amount of acreage plowed, and, as driving itself absorbs power, we may easily be worse off in the final analysis.

There is, however, another and a better way of looking at the problem. We assume a constant engine speed in either case, and a constant power output from the engine. This means that the quantity of fuel consumed will be so much per hour whatever the speed. Pulling two bottoms at four miles, or four at two miles, will give practically the same total time per acre plowed, and if the higher speed is 5 per cent more efficient there should be a gain.

The most important point really is that we do not yet know anything worth mentioning about plowing speeds for best efficiency, from the viewpoint of the plow, and the quality of the plowing. The horse, with its fixed speed, unvaried for centuries, has prevented experiment in this direction. Now that this limitation is removed much may be discovered.

In this respect the tracklaying type of tractor certainly scores, because the small wheels that are used with a chain tread do not require much gear reduction. Suppose, for example, we want three miles an hour at 1000 revolutions of the engine; that the wheel diameter is 48 in. in one case. Then the reduction necessary will be forty-seven

to one. With a tracklayer the wheel might be half the size, or even less. If it were 18 in., then the reduction needed in the transmission would be only eighteen to one.

Amount of Power Absorbed Is Debatable

Of course, it is debatable what amount of power is absorbed by the track, but there is reason to believe that this is less than would be imagined, while the power absorbed by a large wheel in picking up lumps of dirt and cutting its way along is probably more than might be expected. On points like this we need more information, we need scientifically conducted tests; the trial and error method now being used is a costly way of settling engineering questions. Practically the only conclusive way to discover relative advantages of wheel and caterpillar would be to make two machines as nearly identical as possible except for form of drive. One might, for example, take a tracklayer such as the Cleveland 20-hp. machine and substitute rear wheels with a bull-ring drive for the tracks and sprockets. Of course, just a single pair of machines would not suffice more than to indicate the comparative efficiencies; one would need a few score to reach a final conclusion.

Apart from gear drives of all sorts there are others to be considered, but it seems improbable, at least at present, that either electric or hydraulic transmission is likely to be adopted for tractor work. Electric drive might be applied to a very large machine, but if it were there would not be much object in hauling about the engine and generator. Rather would it seem better to deposit the powerplant at a fixed spot and let the tractor be merely an engine on wheels, connected to the generator by cable.

Hydraulic drive is the more promising of the two, but the writer is not aware of any system of hydraulic gearing devised to give a large reduction. All those developed for motor-truck use have a high-gear position where the hydraulic apparatus is inoperative, and if a hydraulic gear is to do successful tractor work it should provide a permanent twenty to sixty to one reduction. There is opportunity here for inventors to show what they can do. If the efficiency of gearing can be improved substantially a direct saving in fuel would

result, and this is worth even an increased first cost.

Yet another opportunity, still to be tried, is the application of a high-pressure, oil-fired steam plant; such a plant as is used in the Stanley or Doble cars. A tractor so equipped would bear but small resemblance to the old-style steam tractor; it would use the heaviest of oil fuels, or even coke. Effective condensation is not impossible, so that the water supply difficulty could be overcome. Of course, this suggestion will raise many a smile, but it is not altogether absurd. The degree of automaticity of the Stanley and Doble cars is little appreciated because there are so few of them and so few people that know anything about them. They are as greatly different from the old steam engine as is the modern gasoline engine from the gas engine of twenty years ago. The Stanley and Doble companies are losing a great chance if they do not try out their systems in tractor form.

Need for Best Types

However, all these things are for the future. Whatever may be tried, and whatever ought to be tried, the big fact now is that we want the greatest possible number of the best tractors we know how to manufacture. This fact will probably produce a situation which will exercise considerable influence upon tractor design for some time to come.

There is great demand for tractor parts, stock parts which can be assembled readily anywhere. Such parts are coming, and coming soon. In an earlier article it was mentioned specifically that engineers had trusted to truck parts, and found them too light in many instances, cooling fans being mentioned as a specific example. The effect of this was to bring the writer letters showing that special tractor fans can now be bought as stock parts—real tractor fans, and not stiffened truck designs. That some of our leading axle makers are only waiting to be quite sure what to make before they begin production is certain, and any slackening in the passenger-car business will enable the gear companies to follow suit. Thus, before the year is out it is safe to say we shall have several more stock engines, stock axles and stock transmissions. Stock axles will lead to stock hubs, and so to complete wheels.

All this will happen much faster than it did in the motor car field, and the danger is that by following the passenger-car procedure in this matter we may tend to crystallize design too swiftly. Though stock parts are wanted urgently, it is to be hoped that their manufacturers will not invest very large sums in fixtures which cannot be altered except at immense cost. The tractor stock parts business should be entered gently and warily from the engineering and manufacturing viewpoints.

In concluding these notes on tractor design as it is to-day, and as it appears likely to be in the future, the writer again enters the plea for high-grade material and work-

manship. The tractor needs the very best of both far more than the motor truck, far more than the passenger car. It ranks second only to the airplane. The tractor has come because its economy over other methods is making it a necessity. In order to save a few dollars of first cost it is utterly stupid to sacrifice reliability or fuel efficiency. The reduction of weight in proportion to drawbar power and the increase of efficiency in transmission are the two great tasks before engineers. That those engineers be not hampered by strangling price restrictions is enormously important to the whole civilized world, for the efficiency of the tractor and the cost of food are intimately bound together.



Kerosene the Future Fuel

DETROIT—Editor MOTOR AGE—Daily
It is becoming more apparent that the war on which we have embarked is to become a war of internal-combustion engines. In motor cars, trucks, airplanes, submarines, patrol vessels, and submarine chasers, engines of this type will attack and defend. And our confidence of victory rests chiefly on our belief that we shall be able to develop this arm to limits which it has never attained before.

I have been careful in the adjective chosen to describe this engine type. To limit to gasoline the fuel to be used in all this wide variety of engines would be, beyond question, poor prophesy, for, before this war is far advanced, a very large proportion of these engines will be successfully using kerosene and possibly even lower grades of the crude.

In no other way can we hope to secure an adequate amount of fuel for the tremendous task that is before us. In no other way can we conserve a supply which is already showing signs of diminution.

By using kerosene for the marine branch of this internal-combustion service alone we will tremendously conserve our resources and without the least loss of efficiency, and it is this branch which will use by far the greatest supply of fuel.

Private yachts and patrol vessels will soon be in use by the hundreds—by the thousands. They will use fuel by the barrel where motor cars, trucks and airplanes will be using it by the gallon. With these vessels doing their work on kerosene, the preferred fuel will be amply sufficient to carry us through.

Fortunately, the conventional four-cycle marine engine is easily adaptable to kerosene. The heat of the kerosene explosions is easily regulated by the unlimited supply of cool water, always at hand. Thus is obviated at once the chief difficulty con-

needed with the use of the lower-grade fuel. Hot points do not develop and the tendency to pre-ignition disappears.

Compression and other minor changes in the engines may be necessary, but they are of a simple nature. The vaporization of kerosene is a process entirely divorced from necromancy or mystery.

It has been done—done in adverse conditions and in so public a way as to make it amazing that doubters can still be found. Only a few years ago a pair of young men drove a motor car around the world, using kerosene as fuel and penetrating many regions where gasoline could not have been procured.

In racing, kerosene has shown itself a dangerous rival to the highest test fuel obtainable. Three seasons ago a team of kerosene-burning racing cars competed on even terms with the entire field of international flyers, winning a share of the money in virtually every event they started in and showing the way to the finish in one of the biggest speed classics of the year.

That kerosene is not now more widely used for passenger cars and trucks is due to very definite conditions, none of which are vital. Kerosene is unsatisfactory for starting purposes. The presence of a supplementary gasoline tank has been a complication from which manufacturer and motorist have shrunk.

The odor of kerosene has furnished another objection to its use in passenger cars. The greater proportion of heat units resulting from the use of kerosene threw too heavy a strain on the cooling facilities of improperly designed motor car engines and resulted in their failure to attain maximum power when using the low-grade fuel.

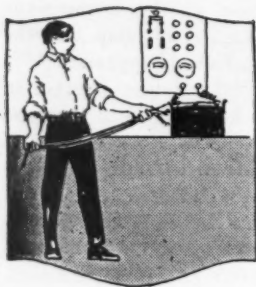
The price of gasoline remained at a figure where, in an era of prodigal expenditures, the incidental handicaps involved by the substitution of kerosene over-balanced the saving of fuel cost.

None of these conditions will prevail in the case of the high-powered marine engines which will soon be draining the gasoline supply of the country if we do not conserve it.

Picked men give their sole attention to the operation of these marine engines. Details of starting will be simple for them to handle, nor will they be distressed by the odor of the lower-grade fuel.

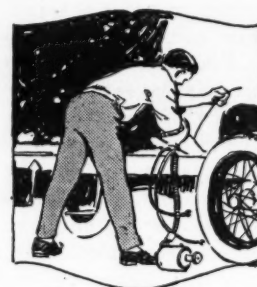
From a long experience in study, experiment and demonstration, I am fully confident that immediate attention to the equipment of these engines for the use of kerosene will save this country millions of barrels of gasoline in each year of the war. This precaution even may mean the difference between an indefinite prolongation of the struggle, and a reasonably prompt and thoroughly decisive victory.

By this means we shall also be able effectively to combat Germany's perfection of the Diesel principles to a degree which we cannot hope to equal in a long period.—Ray Harroun, Vice-President Harroun Motors Corp.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the fifty-third installment of a weekly series of articles begun in MOTOR AGE issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered.

Part LIII—Ignition Continued

If a current of electricity be established in a wire there will be a magnetic field produced about the wire. The strength of the magnetic field will depend upon the value of the current in the wire and its direction will depend upon the direction of the current in the wire. Any change in the value of the current in the wire will result in a change in the strength of the magnetic field, it increasing with an increase in the value of the current and decreasing with a decrease in the value of the current. A reversal in the direction of the current will result in a change in the direction of the magnetic field.

Now if the wire be formed into a coil as shown in Fig. 293, a much stronger magnetic field will be produced inside the coil than was originally produced near the straight wire. Inserting an iron core inside the coil will increase the number of magnetic lines passing through the coil due to the fact that iron is a better conductor of magnetism than air, just as copper is a better conductor of electricity than iron.

Let us now investigate what will happen when such a coil is connected or suddenly disconnected from a source of electrical energy such as a storage battery. Just at the instant that the circuit is closed, the current starts to increase in value at a very high rate but it cannot reach its maximum constant value, which

is equal to the electrical pressure divided by the resistance, in zero time for the following reason: As soon as there is any current at all in the wire there will be a magnetic field produced and this magnetic field will increase in strength as the current in the wire increases. While the magnetic field is increasing, the magnetic lines through the coil are increasing in number and an electrical pressure is set up in the various turns of the coil whose direction in the circuit is just the reverse of the electrical pressure of the battery or other outside source of pressure producing the current. As a result of this pressure being produced in the circuit and since its direction is opposite to the direction of the current, the current will not build up in value as rapidly as it would if there were no pressure being produced. When such a circuit is opened there will be an electrical pressure produced but its direction will be just the reverse of what it was when the circuit was closed or its direction will correspond to the direction of the current. Thus, this electrical pressure produced in a circuit due to any change in the value of the current in the circuit is always in such a direction as to tend to prevent any change taking place in the value of the current. An electrical circuit in which there is an electrical pressure produced when there is a change of current in the circuit is said to possess self-inductance. The value of the self-inductance of a coil will depend upon the number of turns in the coil, the size of the turns, the length of the coil and the kind of material forming the core.

If an electrical circuit containing considerable self-inductance be quickly opened, there will be a tendency for the current to drop to zero value instantly, which would result in the magnetic field about the circuit being destroyed in a like time. This change in circuit and magnetic field does not take place instantly, because, as the magnetic field decreases in value there is a pressure produced which tends to maintain or prolong the current. The value of this pressure may be many times the value of the pressure of the source of energy and as a result it will be ample to maintain an electric arc between the two points where the circuit is being broken. The duration of this high pressure is determined by the time required for the magnetic field to be reduced to zero value.

The rapidity with which the current in a circuit containing in-

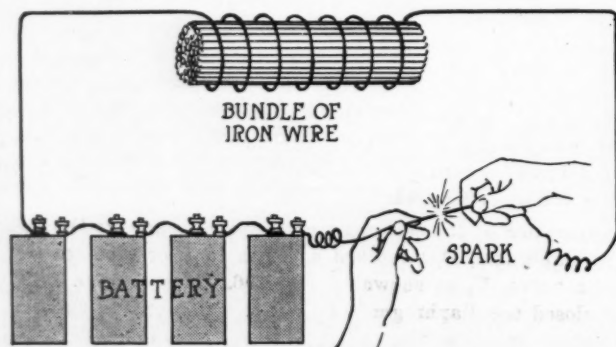


Fig. 293—Illustration of principle of make-and-break spark coil

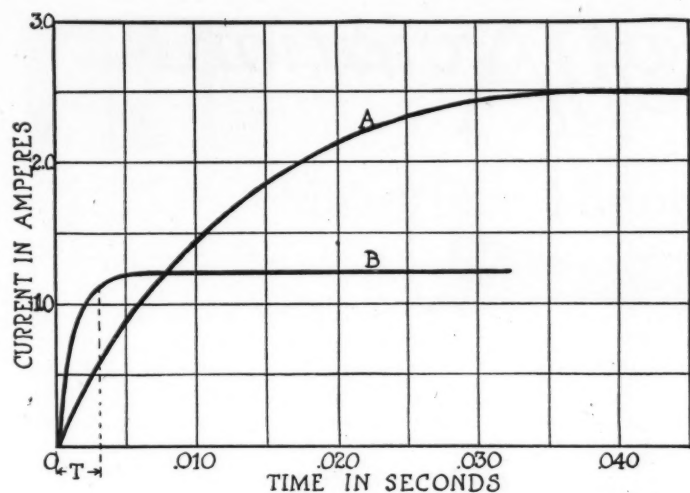


Fig. 294—Curves showing the relation between current and time in an inductive circuit while current is increasing

ductance builds up in value when the circuit is closed and decreases in value when the circuit is opened depends upon the relation between the inductance of the circuit and the resistance of the circuit. The larger the resistance and the smaller the inductance, the less the time required for a certain change in the value of the current to take place. Thus the current in a certain circuit might build up in accordance with the curve, A, shown in Fig. 294, in which the height of the curve above the horizontal represents the value of the current and the distance along the horizontal corresponds to time. If the resistance of the circuit be increased the current will rise in value more rapidly, but it will, however, not reach as high a maximum value. The operation of the coil may be such that the circuit is closed only for the time, T, as shown in figure and in such a case the value of the current in the circuit with the resistance in series will be greater than without the resistance. Hence it is sometimes possible to improve the operation of a coil by placing a resistance in series with it and thus increase the rapidity with which the current builds up. The effect of the resistance on the decay of the current is to cause the current to drop off in value more rapidly.

The magnetic field surrounding the coil represents a certain amount of stored energy and it is this energy which is transformed into electrical energy when the circuit is broken and then in turn converted into heat in the electric arc at the point of break. The greater the inductance of the coil and the larger the value of the current the greater the amount of energy stored in the magnetic field. There is, however, a limit to the amount of energy required in the spark and it is not economy to design the coil so as greatly to exceed this value.

Fundamental Principles of the Jump-Spark Coil

The construction of a typical jump-spark coil is shown in Fig. 295. It consists of two coils about an iron core. One of these

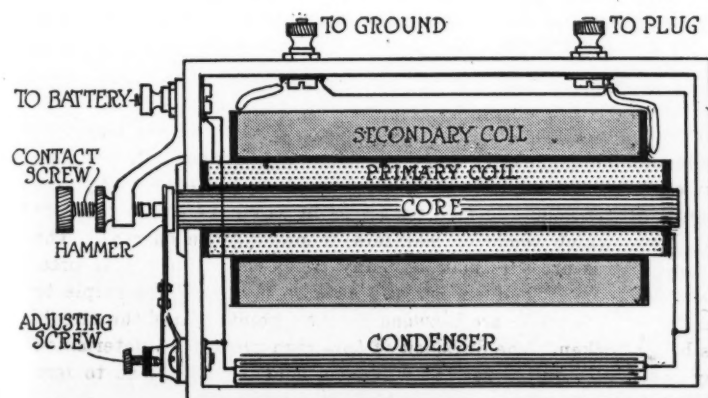


Fig. 295—Construction of typical jump-spark coil

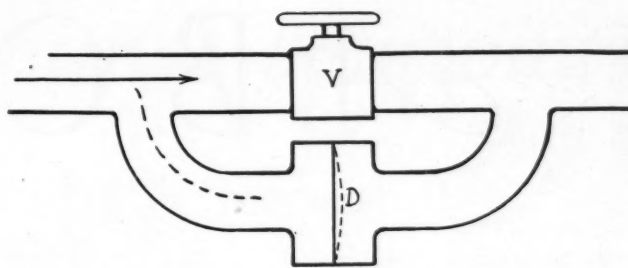


Fig. 296—Hydraulic analogy of the condenser across breaker contacts

coils, called the primary, is connected in series with a source of energy and a vibrator similar in principle to those used on an electric door bell. The second coil, called the secondary, is wound outside the primary and it consists of a relatively large number of turns as compared to the primary and of much smaller wire.

Any variation in current in the primary winding will cause a change in the magnetic field within the secondary winding which will result in an electrical pressure being produced in the secondary winding while the change in magnetic field is taking place. In the operation of the coil, the circuit is controlled by a contact which in turn is opened and closed at a definite time in relation to the position of the piston in the cylinder of the engine. When this contact is closed, the current immediately builds up in the primary winding and of course magnetizes the soft-iron core. The iron core then attracts the iron armature or hammer, and it is drawn toward the core, which causes the electrical circuit to be opened at the contact on the end of contact screw. As soon as the primary circuit is opened, the armature returns to its normal position, since there is not sufficient current to magnetize the iron core. Just as soon, however, as the electrical current is again closed at the end of the contact screw, assuming the other contacts are closed, the above operation will be repeated. Many cycles of this operation may be completed during the time the contact in the primary which is controlled by the gas engine—the timer—is closed.

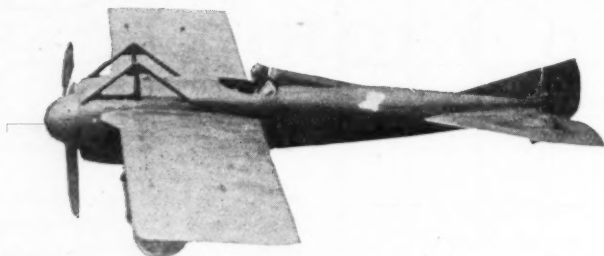
While the magnetic field within the secondary winding, due to the primary current, is building up in value, there will be an electrical pressure produced in the secondary winding and its direction will be such as to produce a current which tends to oppose the change in the magnetic field. Likewise, when the magnetic field in the secondary is decreasing in value, there will be an electrical pressure produced and its direction will be such as to produce a current which tends to oppose any change in the magnetic field. It is thus seen that the building up and decaying of the current in the primary winding causes an alternating pressure to be produced in the secondary winding. The value of this pressure in the secondary will depend upon how rapid the magnetic field is changing and the number of turns in the secondary winding. The change in the magnetic field depends upon the time constant of the primary winding, that is, the relation between the inductance and the resistance of the primary winding. The more rapidly this magnetic field can be changed in value, the greater the pressure induced in the secondary winding.

Purpose of Condenser in Jump-Spark Coil

The condenser used in combination with a jump-spark coil acts as an electrical shock absorber. It is connected across the breaker contacts and when they open the energy which would normally go into the arc is stored in the condenser, thus eliminating the serious troubles due to the arc. The current in the primary circuit is reduced to zero more quickly and a higher voltage is produced in the secondary winding.

The operation of the condenser might be compared to the operation of diaphragm, D, stretched across a tank or pipe connected around a valve, V, as shown in Fig. 296. If the valve be suddenly closed the diaphragm relieves the strain on the valve to a great extent and thus allows the flow of liquid to be reduced to zero in a shorter time than it could be if no diaphragm were used.

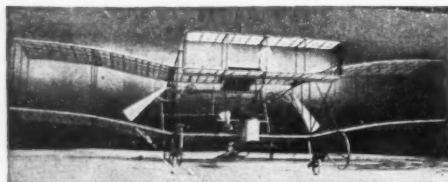
A. B. C. of Aviation



Development of the Airplane

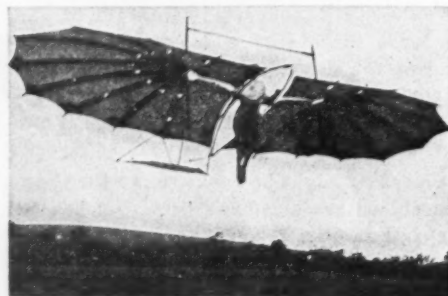
THE earliest instance of the true airplane of which we have any record is embodied in the design of Sir George Cayley as far back as 1800. It was a startling approach to what present-day success has shown to be necessary for flight. It had a single, long, narrow plane, of what has proved to be almost the proper proportions, and was designed to be drawn by two screws run by chains from a single engine, in much the same way as the early Wrights. His first attempt was really the original glider, as it had no motor. A second machine was built with a compressed air engine, but the machine was smashed and nothing further was done. In 1842 Henson designed a machine with a single plane much like the present French monoplane and used a 20-hp. steam engine.

The actual starting point of investigations which ultimately showed the possibility of human flight was in 1888, when several scientists took up the problem simultaneously but independently. These were Professor Langley in America, Maxim in England, Lilienthal in Germany and Hargrave in Australia.



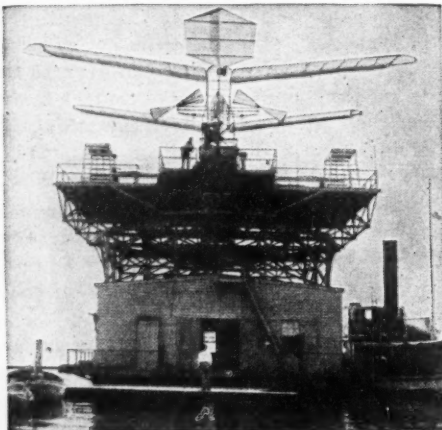
Maxim's \$100,000 airplane

Maxim's experiments resulted in the construction of a huge biplane with a steam engine and two propellers, which is illustrated above, and cost \$100,000 to build. The machine was wrecked in the experiment.



Lilienthal's Glider in flight

Two years later Langley made his now historic experiment with steam models. Two attempts were made with Charles Manley as the aviator to shoot the machine into the air from the top of a houseboat, as shown below, but both attempts were failures. Meanwhile Lilienthal and Chanute of Chicago were experimenting with gliding planes without motors, which depended on the upward pressure of the air for their operation. Lilienthal's glider is shown below.

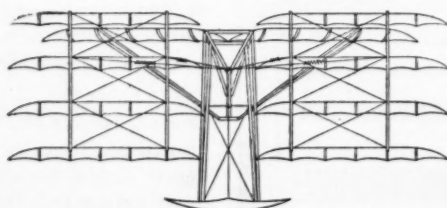


Langley's Aerodrome being launched from a house-boat

It was at this time, 1896, that the Wright brothers commenced studying the subject of flying and commenced their experiments with the gliders, flying them as a kite at first to study their actions and then operating them themselves. The Wright glider is shown here.

The first power flight in an airplane to be made by man was on the 17th of December, 1903, at Kittyhawk, N. C., with one of the Wright brothers aboard. The first flight lasted only 12 sec., but it was the beginning of a series of longer and longer flights and the real beginning of present-day aviation.

The first Wright power-driven machine had two planes, one above the other, and two pro-

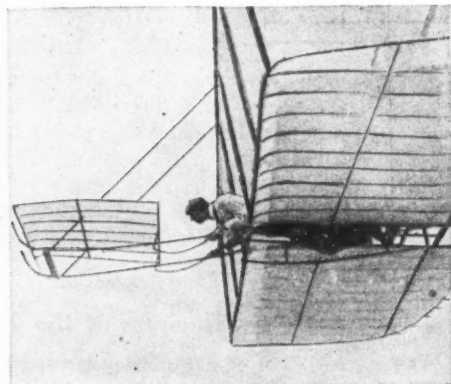


Chanute's Glider

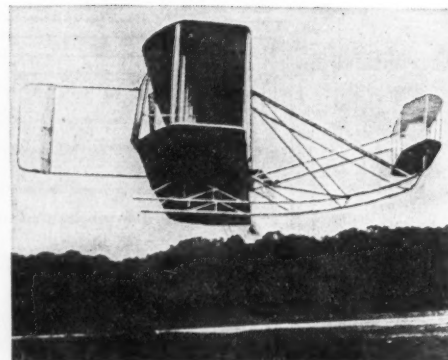
pellers, placed at the rear, and was driven from a gasoline engine by chains and sprockets. Two smaller planes set forward of the main one, which could be tipped up or down, guided the machine up or down, and a vertical runner at the rear turned it to right or left. In starting the machine was mounted on a small car, which was pushed by hand along a single rail after the motor was started. Two runners, like sled runners, were fastened below the planes. The runners were used to prevent damage to the machine in the alighting.

It is to the gasoline engine that most credit must be given for the rapid advance of aviation during the next fifteen years to the present time. Without the internal combustion engine it is doubtful that power apparatus sufficiently light in weight could have been obtained.

Above is one of the latest types of fast scout airplanes in use by military aviators on the European front. Comparison of this with the first Wright power-driven machine gives some idea of the advance that has come in the art.



Wright Glider



The first airplane flight—Wright's



From the Woman's Viewpoint



Make That Motor Vacation Successful!

IF it were not for being taken as a slang slinger, we might start off by saying that the woods are full of them. Even then you might know that picnic parties were what is meant, as in some parts of the country the picnic season has been on for some time and in practically every part it is now on.

The gentle spring was overdue when summer sprang in, but now that both have come and spring has been superseded by midsummer everybody forgets how hateful the weather was and glories in the present. Where to go and what to take are two ideas born in the mind of the motoring American family every year, and even if you cannot indulge in touring proper, there is nothing like the short trip, which perhaps takes just a few hours in the evening, to take its place.

The car is a versatile creation. For some time one of the necessities of a successful business and every-day life, it has longer been the source of many joys and pleasures for the riders therein. As the experience of those who utilize it increases it brings even more, for who can say that the man or woman who knows what to take does not get more out of the car than do those who are fretted constantly by a pile of useless baggage which worries everybody and is lacking in many of those things needed most.

Short-Order Camping

It used to be—before the vogue of motor cars—that a hayrack furnished the ideal outing. Now it is the motor truck. Then there is the small family picnic party that goes up the river, to the woods, out in the country or to the creek, makes its supper fire and cooks weiners, fries eggs and bacon and does all the other things that picnickers are likely to do.

There is no end to the short-order camping that can be done through the agency of a motor car. Get out of the store or office at 6:30, gather in the family and try a jaunt of a few miles to some favorable camping spot. Then make a fire, a real camp fire—and do not blame it all on the fire if it smokes a little sometimes, for it may be that you have not entirely mastered the art, you know. First gather up a few stones, the smoother, of course, the better. Then get the firewood. There are always foragers, natural born, it seems, who will be glad to do this part for you. Build the fire between the stones and set the skillet, or frying pan, on top of the stones. Get dry wood if at all possible, as dry wood gives less smoke trouble than green, besides being more easy to keep burning. It probably will be a temptation

to gather all the dead leaves out of the hollows and gulleys for the fire, but remember that hollows and gulleys are apt to be damp, and if the leaves are damp, woe unto ye camp fire, especially if you have started cooking and are dependent on a large pile of the same brand of leaves.

If you are cooking potatoes, Irish or sweet, just bury them in the ashes as you read about in novels, and the ashes will do the rest. If it is bacon you are cooking, there is more than one way to do this. The most co-operative way is to make every fellow get a long stick with a pointed end and cook his and her own pieces. It takes no time to crisp the slices, and there is just as much fun in it as in toasting marshmallows.

Food Conservation

DO you know, asks Commissioner Sells of the Bureau of Indian Affairs—

That every bit of uneaten cereal can be used to thicken soups, stews or gravies?

That stale bread can be used as the basis for many attractive meat dishes, hot breads and desserts?

That every punce of skimmed milk or whole milk contains valuable nourishment? Use every drop of milk to drink or to add nourishment to cereals, soups, sauces and other foods. If you do not want milk to sour, keep it cool, clean and covered continually. Remember, too, that sour milk, buttermilk and sour cream are valuable in cookery; so do not waste any. Sour milk and buttermilk can be used with soda in making hot breads, or sour milk can be turned easily into cottage cheese, cream cheese or clabber. Sour cream is a good shortening in making cakes and cookies and useful for salad dressing and gravies for meat.

That every bit of meat and fish can be combined with cereals or vegetables for making meat cakes, meat or fish pies and so on and to add flavor and food value to make dishes?

That every bit of clean fat trimmed from meat and every spoonful of drippings and every bit of grease that rises when meat is boiled can be clarified, if need be, and is valuable in cookery? Don't fatten your garbage pail at the expense of your bank account.

That when meat is boiled the water dissolves out some valuable food and flavoring material? Save such water for soup or for use in stews or gravies, or for cooking vegetables. Save and keep soup stock. Every professional cook knows that keeping a soup or stock pot is an essential economy.

That valuable food and flavoring get into the water in which rice and many vegetables are cooked? Use such water for soup making if it has an agreeable flavor. Don't pour nourishment down the sewer.

That careless paring of potatoes or fruits often wastes as much as 20 per cent of their food material?

That the outside leaves of lettuce and the tops of any vegetables make desirable cooked greens or even salad?

To fry eggs at a picnic, of course, requires a frying pan of some kind, though anything that will offer a flat, level surface will do. Though you may not have done it, a smooth, even stone, well heated, does just as well as anything else.

Did you ever try to make Welsh rarebit over an open fire? You have missed the time of your life if you have not tried it. No doubt, though, you have done something else as unusual and as exciting. Take a hollow on a windy hillside, with the fire built down in a little rift, so placed that the cook's feet roam up or down hill and are never on a level. Start the fire with the results of the first foraging and then persuade the wood foragers to stand around and watch the mysteries of the sacred dish. It won't take much persuading, especially if the climb for stray sticks and branches is up a steep hill, and there seems to be a superabundance of beautiful dry leaves that everybody knows will burn just as quickly and as hotly as old shingles off the house.

Picnickers have tried this method. The result has been a new kind of Welsh rarebit, good but distinctly in its own class when it comes to taste. Take a little touch of smoke, add particles of crisp leaves for just a bit of seasoning, not to mention the ingredients that go into all Welsh rarebits, and the result is fun if nothing else, as well as an edible new dish.

Simplified Drinking

Lemonade and tea may be simplified on the motoring picnic trip by a little forethought. Make a lemon sirup by boiling together 2 qt. of water and four cupfuls of granulated sugar for 12 min., adding one and a half cupfuls of lemon juice. Poured into glass bottles it will keep perfectly. When lemonade is desired all you need do is put two teaspoonfuls into a glass and fill with ice water. Tea is not so simple. It cannot be kept very long. But it can be carried to the picnic scene in its own little refrigerator if you use a vacuum bottle, and no ice need be taken along. That is one objection to making lemonade on a trip. The bother of carrying ice. All motorists do not have their cars equipped with iceboxes and do not wish to carry ice in the tonneau.

You can easily make a provision box if you have none already. It can be made at home out of old lumber or an old box and fastened to the running boards by straps or, better, stationary clamps, which can be bought for a small sum. There it is out of the way of passengers, though many motorists prefer to carry the provision box underneath the roborail in the tonneau.



The Readers' Clearing House



Connecting Ammeter on Old Model Cars

TEXAS CITY, ILL.—Editor MOTOR AGE—

I have noticed several inquiries in the Clearing House columns from time to time regarding the installation of an ammeter in the old Delco 6-24 volt starting and lighting systems, and in other single unit systems. The answer has been that an ammeter could not be successfully installed in these systems owing to the fact that it would be necessary to carry the starting current through the ammeter, overloading it and consequently spoiling the instrument.

I have a car equipped with the old Delco system on which I wished to fit an ammeter, and being unable to find an ammeter in the open market, I wrote to the Weston Electrical Instrument Co., Newark, N. J., explaining my system to them and they informed me that they could furnish an instrument which would satisfactorily handle it. I installed one of these and have been using it over one year, and it has given absolute satisfaction. I consider that it has more than paid for itself through giving me a check on the system and enabling me to correct any fault before it becomes permanent.

Directly after installing my ammeter, I experienced trouble which I will go into more fully as there may be others who have a like system who may have the same difficulty. The symptoms of this trouble were as follows: The battery would charge all right at slow engine speeds, but when the car or engine was speeded up to about 20 m.p.h., charging would stop until the car was slowed down to about 5 mi., also when charging it would start and continue until the speed again reached 20 m.p.h. I undoubtedly would not have noticed this if I had not had an ammeter, as in adjusting the ampere hour meter and filling the battery, if I had started the engine to observe if the battery was charging properly, I would have run the engine at a moderate speed while making observation and would

Not Necessary in This Case to Carry Starting Current Through Instrument

have concluded, very properly, that if charging was satisfactory at a low speed it would be even better at a high speed. As a consequence my battery would have been ruined, or at least badly sulphated and even then I would likely have attributed the main trouble to the battery instead of where it properly belonged.

Now as to the trouble proper, there are in the Delco system two overrunning clutches, one at each end of the motor-generator, to allow it to be operated as either a motor or generator. My trouble was that the front clutch was slipping at high speeds, although it would hold at low speeds and at all times revolve the armature fast enough so that it was impossible to observe the slipping with the eye, or to slow it down with the finger. But when I applied a soft pine stick with some pressure to the commutator, it stopped immediately. Also, the generator developed enough current to just barely close the cut-out relay contacts, but it was very weak, leading one to suppose that the trouble might be in it, or in the ampere-hour meter contacts.

Trouble similar to that which I had with my old system can be overcome by squirting coal oil on the clutch, first removing the plate which covers it. If this does not permanently solve the difficulty, it will be necessary to take the clutch down and dress down the body or cam, to a smooth surface where the four rollers work. The latter will probably have worn a slight trench so that they do not wedge and cause the generator to revolve properly. A carborundum whetstone is a good thing to use in dressing, as they are too hard to file and it is too delicate a job for an emery stone.

Now in regard to this ammeter, I will

say that this instrument is equipped with an outside shunt inserted directly in the main current carrying wire. In the Delco systems, this is the wire which runs from the ampere-hour meter to the bottom blade, right hand, on the controller switch. The ammeter is wired in parallel with this shunt. It is scaled 25-0-150 but the company informs me that it will carry a current of 300 amperes without injury.

Here is another item which may be of interest to MOTOR AGE readers. If those having cars previously equipped with air pressure gasoline feed systems, having a pressure gage no the dash, and who have installed the vacuum system of feed, will adjust the air gage by bending the copper tube on the inside so that the hand will stand at the right hand side, and will come back to the 1 side by sucking on gage inlet and attach this gage by a hollow brass or copper pipe to the opening in top of vacuum tank, where the plug is, making all connections tight, they can very easily ascertain their gasoline mileage by watching this work, as their tank delivers 1/40 gal. per action. By dropping the cipher, and multiplying the 4 by the number of tenths their speedometer shows they have driven between actions of tank it will give them the number of miles they are getting per gallon, besides giving a check on the vacuum system.—Cecil C. Camp.

CASE HARDENING SMALL PARTS Necessary to Heat Metal Sections Uniformly

Central City, Neb.—Editor MOTOR AGE—I would like a method for case hardening small parts.—Ralph Perry.

Small parts such as pinions, nuts, etc., can be case hardened by heating them to a uniform bright-red heat and thrusting them into finely powdered yellow prussiate of potash. The operation should be repeated five or six times and while the material is still at a red heat it is plunged into clear cold water. By this process, the

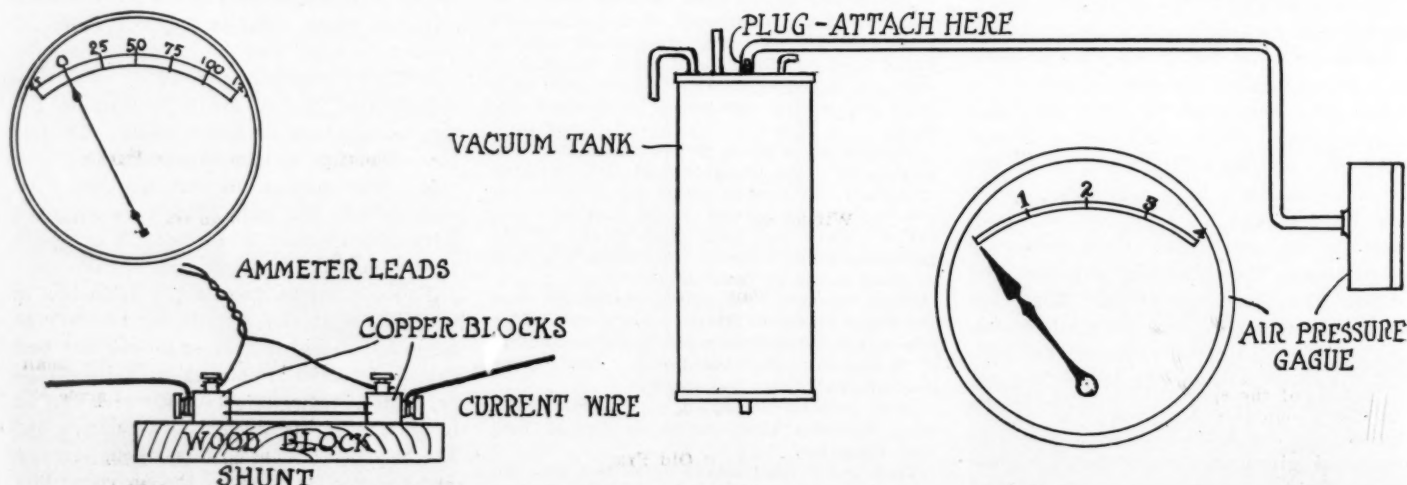


Fig. 1—Method of connecting ammeter wires to the current carrying wire, showing the outside shunt. At the right is shown manner of using air pressure gage for determining mileage and checking vacuum system

mild steel absorbs carbon from the potash, to a thickness of a little less than $\frac{1}{2}$ mm. This surface will become very hard upon cooling. Before treating such parts as nuts or bolts, which have threads, it is well to fill them with clay. This will prevent the carbonizing material from coming into contact with the threads and spoiling them. Parts made out of tool steel can be hardened by heating them red hot and plunging them into cold water. The point to remember here is not to heat the part too little or too much, for in either case the result will not be satisfactory. Also when such parts as drills or rods are thrust into water, they should be held in a vertical position. Otherwise they are sure to be warped out of shape.

SOME ELECTRICAL INFORMATION Functions of the Condenser Defined and Explained

Fort Sam Houston, Tex.—Editor MOTOR AGE—If, during one revolution of the armature of a magneto, it gives a current from a zero to maximum to zero flowing in the positive, and from zero to maximum to zero in the negative direction, or, in other words, on an alternating current, does the current in the secondary windings flow in the opposite direction each time the current changes in the primary? Also will the current flow through the secondary wire to the spark plug to ground and the next half of a revolution, flow from the base of the magneto to the ground part of the spark plug, jump the gap and return by way of the secondary wire?

2—Explain in detail the condenser.—M. D. Vail.

1—Yes.

2—There are really two functions of the condenser, which is found on all spark coils and high tension magnetos. One purpose of the condenser is to intensify the spark that takes place at the plug points. The other function is to prevent excessive arcing or sparking at the platinum points on the vibrator of a coil. It is easy to understand that if continuous sparking were permitted at the platinum points, the latter would soon wear out and become pitted. Also they may eventually become welded together through the extreme heat.

Usually the condenser is placed in the bottom of the coil box and consists of a number of sheets of tinfoil separated by waxed paper, or paper that has been dipped in melted paraffin. In some cases mica or other insulating material is used. Every other sheet of tinfoil is fastened together, making two series of sheets which are called the conductors. These series can best be illustrated by being likened to the position taken by the fingers of the right and left hands just before a person is about to fold them. Thus the wrists would represent the connections or wires leading from the two sets of conductors. One of these wires is connected to the wire going to the adjusting nut or screw of the vibrator and the other to the vibrator itself.

The action of a condenser is about as follows: When the circuit is broken by the attraction of the vibrator to the core, the condenser is called upon to decrease the momentum of the current. The abruptness with which the impulses in the primary winding occurs, has much to do with the intenseness of the spark at the plug points. Due to its own inertia, the current which is flowing in the windings of the primary circuit, tends to keep on flowing even after the circuit has been broken. It is this tendency that the condenser overcomes. It does this by absorbing the excess current

that wants to keep on flowing. Should this stray current be allowed to flow, it would jump across the gap between the vibrator screw and vibrator, wearing away the latter as was mentioned above. It is also easy to see that such a derelict current would materially hinder the occurrence of sudden impulses in the ignition.

Dimensions of Ford Bearings

Springdale, Ark.—Editor MOTOR AGE—What are the exact dimensions of the Hyatt roller bearings used in the Ford rear axles and driveshaft?

2—What number of double row ball bearings would replace the Hyatt—meaning stock number.

3—What company makes and sells the steering gear used in the D-45 Buick?

4—Show diagram and mark all dimensions of front axle and steering rods that are attached to the Scripps Booth 1915-4.—A Subscriber.

1—The rear axle shaft bearings are 4 in. long and $2\frac{1}{4}$ in. in diameter, while the drive shaft bearing is $2\frac{7}{8}$ in. long and $2\frac{5}{8}$ in. in diameter.

2—2.44.

3—This is a General Motors product, being made by the Jackson, Church, Wilcox Co., Saginaw, Mich.

Compression Knock Remedy

Hughesville, Mo.—Editor MOTOR AGE—With reference to your answer to George Grimshaw of Berkeley, Cal., as to how to remedy a compression knock in his Hupmo-

Inquiries Received and Communications Answered

Cecil C. Camp.....Texas City, Ill.
Ralph Perry.....Central City, Neb.
M. D. Vail.....Fort Sam Houston, Tex.
A Subscriber.....Springdale, Ark.
Paul V. McAninch.....Hughesville, Mo.
Paul Harshbarger.....Waverly, Ill.
W. W. Hartle.....Los Angeles, Cal.
C. W. Jackson.....San Francisco, Cal.
W. B. Scribner.....Winnipeg, Man.
Morris Butts.....Stow, N. Y.
P. P.....Kentland, Ind.
W. J. Mull.....Mulberry Grove, Ill.
R. J. Ashby.....Republican City, Mo.
J. C. W.....Laredo, Tex.
P. C. Patterson.....Junction, Tex.
G. E. Osborn.....Oconto, Neb.
Arthur B. Smith.....South Brownsville, Pa.
F. C. Newton.....Independence, Kan.
Charles Brasch.....Rochester, N. Y.
J. H. Wigham.....Mangum, Okla.

bile: I found this trouble in 1915 with the model 83 Overlands and upon advice from the factory, I had a $\frac{1}{8}$ fiber gasket placed under the cylinders, which corrected the trouble. Several automobile manufacturers used this method on their cars about that time and before. By placing this gasket under the cylinders it raises them and allows of more combustion space and thus lowers the compression.—Paul V. McAninch.

Wiring on 1912 Apperson

Waverly, Ill.—Editor MOTOR AGE—Furnish wiring diagram for a 1912 Apperson six-cylinder roadster with Gray & Davis starting and lighting system.—Paul Harshbarger.

Wiring diagrams of the early model Apperson cars are not available, but the Gray & Davis system shown in Fig. 2 is applicable to this car, inasmuch as it shows the general layout of this system.

New Manifold on Old Franklin

Los Angeles, Cal.—Editor MOTOR AGE—Would a 1917 Franklin style intake manifold placed on a 1913 Franklin motor improve its running qualities?

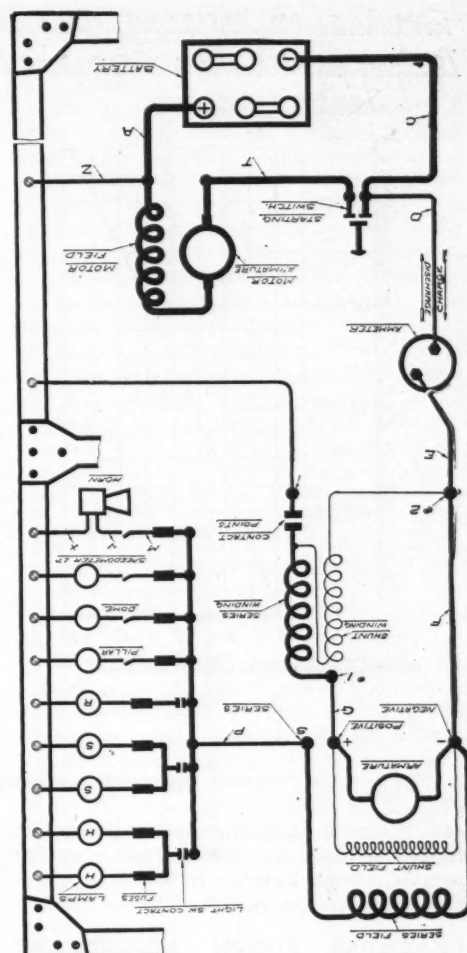


Fig. 2—Wiring diagram of Gray & Davis starting and lighting system of 1912 Apperson

2—Would it not be possible to change a 1913 intake into 1917 model by an experienced man? —W. W. Hartle.

1—By fitting a shorter intake manifold such as that used on the 1917 Franklin, you will undoubtedly get better carburetion for there will be less chance of the gases condensing on the interior walls of the manifold.

2—Yes.

Changing Gear Ratio

San Francisco, Cal.—Editor MOTOR AGE—With 36 by $3\frac{1}{2}$ tires, would there be a noticeable difference—and how much—in the pulling power, by lowering the differential ratio from $3\frac{9}{13}$ to 1, to 4.07 to 1? The car is an American scout model 22 B.—1914.—C. W. Jackson.

There is bound to be a difference, but just how much MOTOR AGE is not able to say.

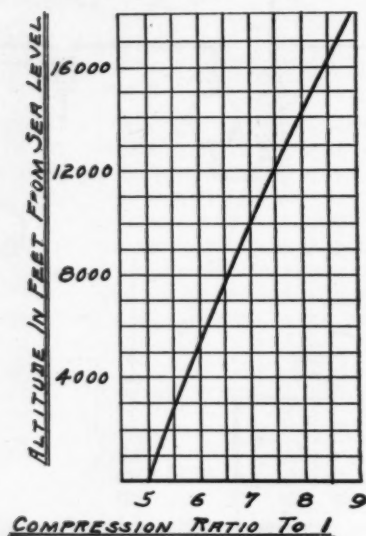
Packing Nut on Water Pump

Winnipeg, Man.—Editor MOTOR AGE—How can I put an outside packing nut on the front end of the water pump of an Ohio, 1912 model? The front half of the pump case was bolted to the timing gear case. I have had this cut off as the water used to get into the timing gear case by following the pump shaft, and there was no way of telling when the front packing was leaking. There isn't room for a large packing nut like the one on the rear. Could not the inside gland be filled up and another bored from the outside, using the same or a similar small nut?

2—What material is the pump case made of? —W. B. Scribner.

1—Inasmuch as the car you mention is an old one, and not made any more, it is rather difficult for us to advise you. We have no records showing the mechanical construction of this particular part of the

**COMPRESSION VARIATION WITH ALT.
TO COMPENSATE FOR DECREASE IN
DENSITY OF AIR**



VARIATION OF DENSITY OF AIR WITH ALTITUDE

FIGURES FOR STANDARD DENSITY OF AIR ARE 760 MM PRESSURE AT A TEMPERATURE OF 16° CENTIGRADE — WEIGHT IS 1.221 KGMS PER CUBIC METER

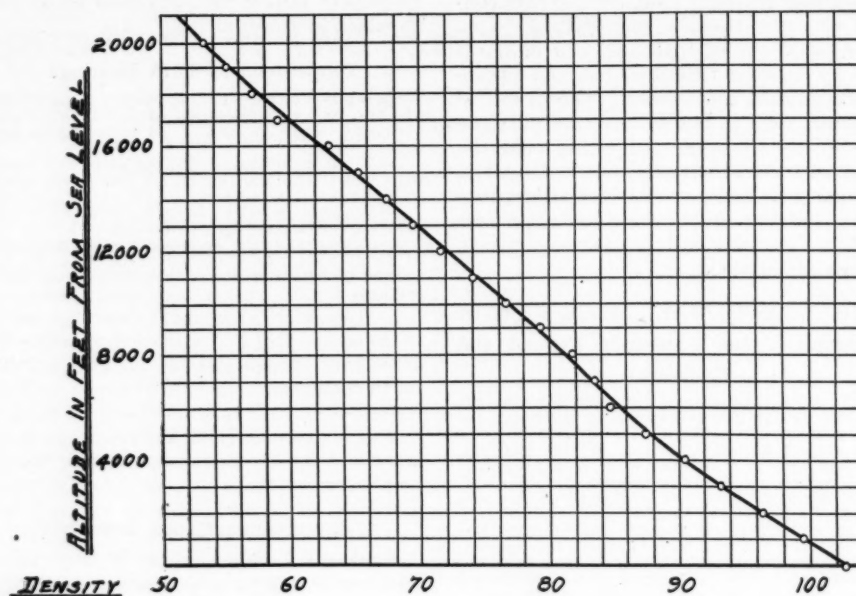


Fig. 3—Charts showing the variation of compression in an engine with altitude and also the variation of the density of air at different altitudes

car, but your suggestion about filling up the inside gland and boring another on the outside, sounds feasible to us.

2—We have no record of this.

**CHALMERS PINION ADJUSTMENT
Lost Motion in Steering Gear Regulated
by Eccentric Bushing**

Stow, N. Y.—Editor MOTOR AGE—Publish a diagram of the differential showing the adjustments in a Chalmers 6-40 model 32. Is there an adjustment for the end play in the axle shaft?

2—How can the play be taken up in the steering gear—that is, in the worm and gear?

3—Give complete data on lapping in new pistons and rings in new cylinders.

4—Where would be the proper place to put a leakproof ring when only one is used to the piston?—Morris Butts.

1—The adjustment of the pinion thrust bearings and large bevel gear are shown in Fig. 4. With the propeller shaft and sleeve removed, the shaft, together with the pinion on it, can be slid out of the sleeve A. Removal of the small screw D will permit the screwing in or out of the sleeve C, thereby adjusting the drive pinion in or out of mesh with the large bevel gear. Be sure to replace the screw D after the adjustment is made. Looseness in the thrust bearings themselves may be adjusted by screwing up the threaded collar which will be found locked by means of the locking washer and hexagon cap screw E. After the adjustment has been made, replace the hexagon cap screw E through one of the six holes in the keyed lock washer, thus securely locking the collar upon the shaft. The large annular bearing used behind the pinion at F, will follow the movement of the pinion in or out as it may be adjusted by the collar C.

To adjust the large bevel gear, remove the differential housing cap, which will reveal the spanner adjustment at Y. The loosening of one and the tightening of the other of these spanner adjustments will carry the entire differential gear assembly to the right or left as may be desired. It

may be necessary to loosen the bearing caps during this operation. Spring locking devices and ball thrusts are used at each adjustment. After adjusting this, make sure that all bolts, nuts and locking devices are tight and in good order. Replace the large cover and see that the joint is oil tight.

A sectional view of the steering gear along the ball arm shaft is shown in the lower right hand corner of Fig. 4. Should there be any lost motion in the worm and pinion, the gear D may be thrown closer to the worm by rotating the eccentric housing E of the bearing bushing F until the lost motion disappears. Lost motion through end play in the ball arm shaft G, may be taken up through the thrust screw H.

3—For lapping a piston in its own working cylinder a pasty mixture of powdered pumice stone and water, or fine ground glass is used. Ground glass mixed with a solution of kerosene and oil can also be used for the cutting material. The equipment for lapping a piston usually consists of a long wooden connecting rod attached to the wrist pin in about the same manner as the ordinary connecting rod. The pasty mixture is applied to the interior of the cylinder and the piston, to which the rings have been fitted, is worked in and out by grasping the wooden handle as shown in Fig. 9. During this operation the piston should be rotated in the cylinder, giving it a slight turn at each pull or push of the handle.

When the piston begins to slide freely

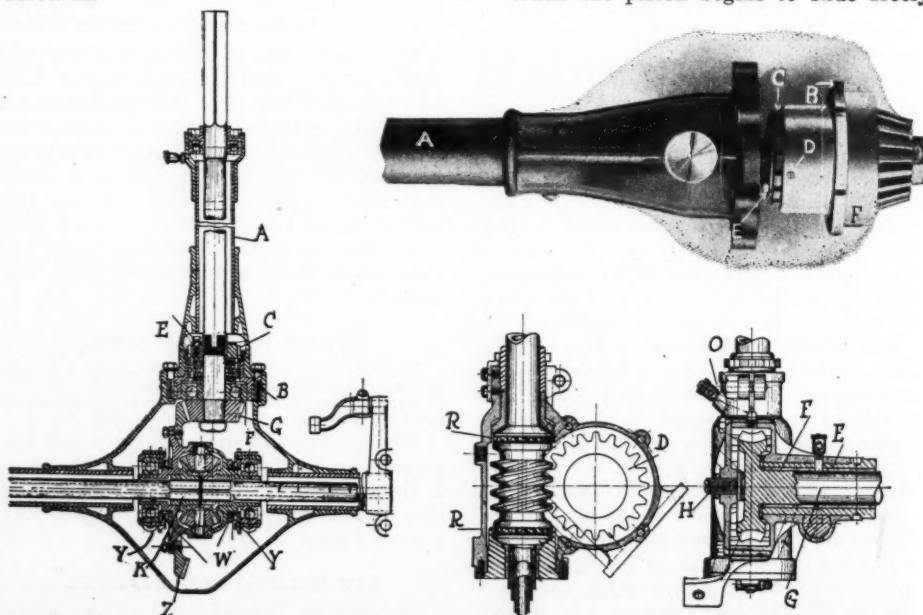


Fig. 4—Adjustments on Chalmers differential and driveshaft pinion. Lower right, steering ing gear adjustments

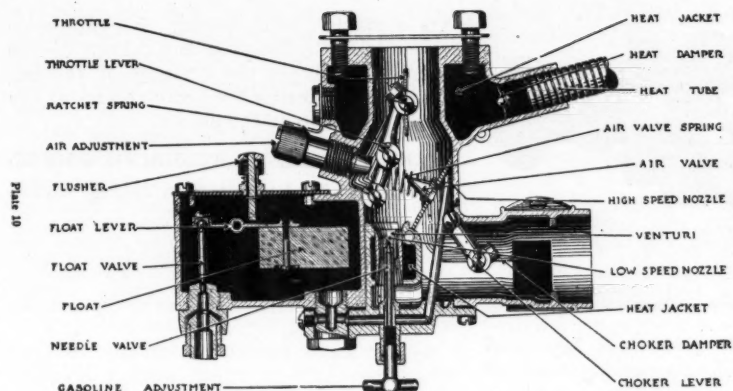


Fig. 5 — Sectional view of the Marvel carburetor as used on the Buick car. There are two adjustments, air and gasoline

in the cylinder, a little Prussian blue, such as is used in fitting bearings, is applied to the surfaces to see if there are any high spots. If little specks of color remain on the interior surfaces, the lapping process must be continued until the walls of the cylinder and the rings are smooth and shiny in appearance. After the pistons have been lapped in, the cylinders and pistons should be given a thorough cleaning with gasoline to remove any traces of the cutting material.

4—At the top.

FRICTION DRIVE ON FLANDERS Cost is Usually Excessive in Making Radical Change

Republican City, Neb.—Editor MOTOR AGE—I have a Flanders 20 on which I wish to put a different transmission and I am favoring the Metz friction transmission. Would it be possible to do this, and what parts would be necessary to buy? Is there any other friction transmission or is there any other style you would recommend?—R. J. Ashby.

It would be possible to make the change you mention, but we think you will be going to a lot of trouble. It has been our experience that where a car is altered by using parts from another car, usually much fitting and machinery is necessary. Of course if you are a mechanic and have a shop at your disposal, the task becomes easier. In your particular case you would have to provide some kind of a coupling on the flywheel for the friction disk shaft and place a main frame cross member at some point on the frame to accommodate the thrust bearing behind the disk. Then there are the jackshaft bearings which must be attached to the car frame, to say nothing of the spring perches on the rear axle. The latter must be placed at a point directly under the frame. You would of course have to fit a Metz rear axle, together with the chain drive and other parts that go with it.

In our opinion it would be better not to attempt rebuilding the car as you mention, for in any case the cost will be excessive, unless you can pick up old parts and do much if not all of the work yourself. And even then you cannot tell whether the results will be what you expected.

Altitude Effects Compression

Kentland, Ind.—Editor MOTOR AGE—I understand that the compression of an engine changes in mountain climbing as you go higher, just like the carburetor mixture does. Is this correct and how much does it change? How fast does the air change in density as you go up?—P. P.

You will find in Figs. 3 and 7 charts to show the compression variation with altitude as well as charts to show the variation of density of air, variation of speed and power with altitude as well as the vari-

ation of temperature with altitude. You are right in your statement that the compression of an engine changes as you proceed to higher altitudes. You will also note that there is a drop in speed and power.

ACTION OF MARVEL CARBURETER High Speed Nozzle Used Only At Greater Engine Speeds

Junction, Tex.—Editor MOTOR AGE—Why is the Marvel carburetor fitted with two nozzles for operating at different speeds? Explain the principles of operation.

2—What are the respective gear ratios of the Buick D-4-35 and the Chevrolet 4-90?

3—Publish a diagram showing how a clutch brake may be installed on a Buick D-4-35.

4—May a storage battery be installed on a Ford and receive its supply from the present

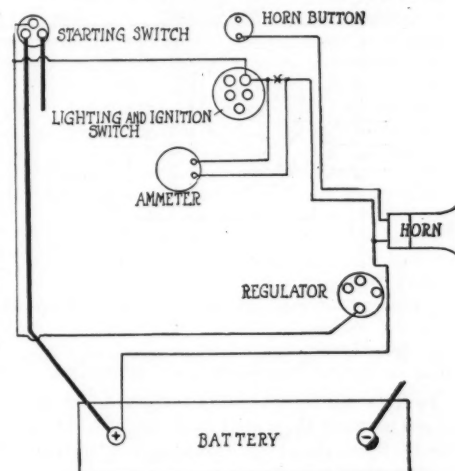


Fig. 6—Installing ammeter on 1915 Grant

VARIATION OF TEMPERATURE & PRESSURE OF AIR WITH ALTITUDE

PRESSURE PER SQ. IN. 9 10 11 12 13 14 15

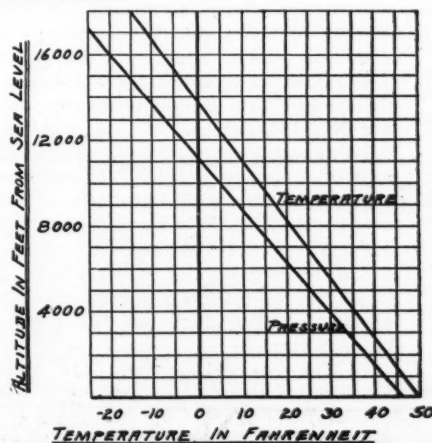


Fig. 7—Charts to show the variation of temperature with altitude and the variation of engine speed with increase in altitude

magneto through a rectifier? Give a wiring diagram showing how the stored current may be cut out at will and used for the lights and horn only, employing the magneto for ignition. —P. C. Patterson.

1—A sectional view of the Marvel carburetor is shown in Fig. 5. As you will note, the float chamber contains a cork float which operates in the same manner as those of the other float-feed type of carbureters. The spray nozzle is located in the mixing chamber and its opening is regulated by a needle valve which constitutes the gasoline adjustment of the carburetor. It is surrounded by the venturi tube through which a portion of the incoming air passes at high velocity, picking up the gasoline spray from the gasoline nozzle. The mixing chamber also contains the air valve and the high-speed nozzle, as shown. The air valve is held to its seat by an adjustable spring which forms the air adjustment. At high speeds the velocity of the air increases until the air valve is lifted from its seat and an additional quantity of gasoline spray is taken from the high speed nozzle.

2—The Buick gear ratio is 4 to 1 and the Chevrolet $3\frac{1}{2}$ to 1.

3—A suggestion for a clutch brake was described in the Clearing House column of Motor Age, issue of May 10. The construction is such that it might be adapted to other makes of cars with some modifications.

4—Theoretically this could be done, but we know of no rectifier on the market small enough to take care of this. Then, too, the current supplied from the magneto is not powerful enough to properly charge a battery.

No Patent on Crankshaft

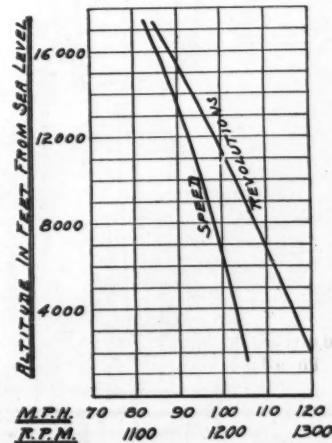
Mulberry Grove, Ill.—Editor MOTOR AGE—How is it that concerns other than the Hudson use a counterbalanced crankshaft when the Hudson company has a patent on it?

2—The rear cylinder on my Reo, four cylinder 1915 car gets too much oil—so much that it works around the spark plug on the outside of the cylinder. What is the cause?—W. J. Mull.

1—The Hudson company has not a patent on the counterbalanced crankshaft, but a patent on certain features incorporated in the Hudson counterbalancing method.

2—It may be that the piston of this particular cylinder is a sloppy fit and thus allows the oil to get past the rings and

VARIATION OF SPEED & POWER WITH ALTITUDE



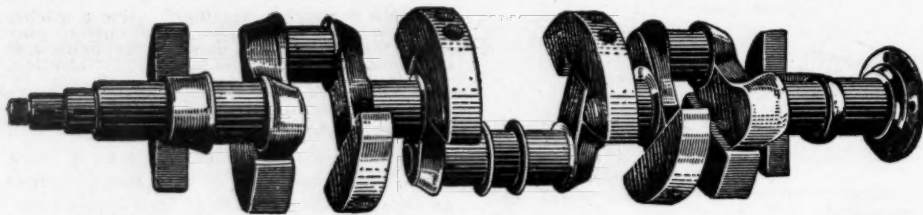


Fig. 8—Disposition of the weights used on the Hudson Super-Six crankshaft

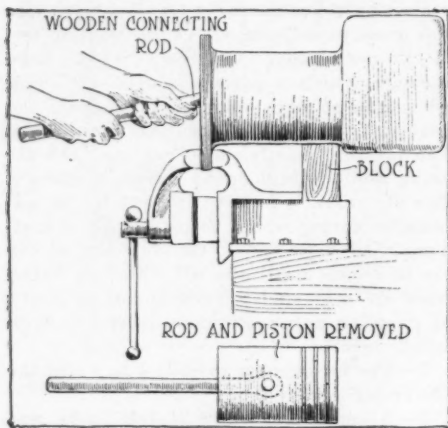


Fig. 9—Method of tapping pistons into cylinders

into the combustion chamber. Or, perhaps the plug you have in that particular cylinder is not in perfect order and does not allow complete combustion of the fuel. Sluggish ignition is often responsible for trouble of this kind. In some cases little dips are attached to the connecting rods which scoop up the oil for lubricating the engine and should your engine be so fitted, it may be that this dip is bent down too far and allowing more oil to be splashed on the walls of the cylinder than is necessary.

Remodelling Old Abbott

Laredo, Tex.—Editor MOTOR AGE—We have a 1914 Abbott Detroit three-passenger roadster model D-34 which is entirely too heavy and we would like to cut it down to look like Fig. 13 on page 45, top drawing, of MOTOR AGE is-

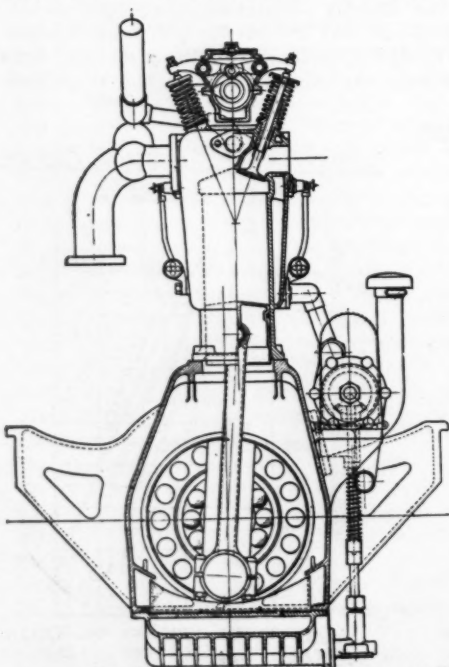


Fig. 10—Cross-sectional view of the Stutz racing engine showing valve mechanism

sue of July 5. What would the approximate cost be and how can we do this? We also want a top on it.—J. C. W.

It is impossible to give exact figures as to the cost of rebuilding a car, inasmuch as so much depends upon by whom and where the job is done. It also depends upon the tastes of the owner. Certain little details will often make the job quite expensive. Everything considered, however, a body like the one you refer to should cost about \$80.

FLANDERS 20 IGNITION QUERIES Method of Timing Flanders Magneto on This Model

Oconto, Neb.—Editor MOTOR AGE—Advise how to adjust the breaker points on the Splitdorf low-tension ignition system such as was used on the 1912 Flanders 20, also explaining the method of removing the brass cover which houses the breaker bar and platinum points.

- 2—How is this magneto timed?
- 3—What is a good solution with which to clean out the radiator and water jackets?

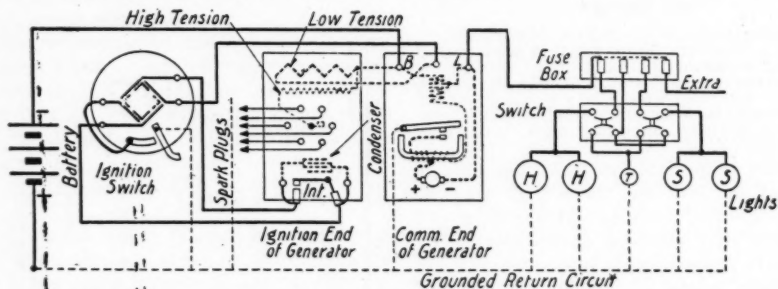


Fig. 11—Westinghouse lighting and ignition diagram, using type B 6-volt generator

4—How is the play in the connecting rods taken up at the crankshaft?—G. E. Osborn.

1—The platinum points should be adjusted so that they will open 25/1000-in. at the farthest point of breaking on the cam. The breaker box cover may be removed by loosening the thumb nut which holds the spring on the breaker box cover and removing the spring which reserves this cover.

2—To time a magneto, turn the engine over so that the piston in the first cylinder will be exactly on top and on the compression stroke. Turn the magneto over—after having first removed the coupling—in the direction that it runs until the points are just about to separate. At this point the distributor arm should be on the segment for No. 1 cylinder. If now, the magneto drive is again connected with the engine, it will be timed properly. When performing this operation see that the arm on the contact breaker box is in the retarded position.

3—A concentrated solution of soda in hot water is generally used for this. Leave it in the radiator and jackets for a few hours and then flush out the whole with clean water.

4—The connecting rods are generally fitted with shims, the latter being inserted between the connecting rod itself and the cap which fits over the end of it and around the crankshaft. When there is play in the bearings, one or more of these shims

are removed, thus letting the cap come closer to the crankshaft and taking up the wear. Sometimes the surfaces of the cap are filed, producing the same results as the removal of one of the shims.

WANTS FLEXIBLE STEERING WHEEL Care Must Be Exercised in Boring Cylinders

South Brownsville, Pa.—Editor MOTOR AGE—Where can I obtain a flexible steering gear such as used by Chevrolet on his Frontenac?
2—To what extent can a Ford block be bored out and what thickness remains to the cylinder walls?—Arthur B. Smith.

1—We have no records of any concern who make such a wheel and it is quite likely that you will have to have it made to order. In many cases, novel features like this are the ideas of the men engaged in the racing game who have facilities for making them in their own shops.

2—Generally speaking you will be playing safe if you do not bore out the cylinders more than $\frac{1}{16}$ in. on the circumference of the cylinder. If you go beyond this figure you will be running the danger of striking, what is commonly referred to as a blow hole. The latter is simply an imperfection in the casting and if it is not too deep can sometimes be successfully filled up with an alloy. It is hard to tell just what thickness will remain to the cylinder walls, because you cannot look on the inside of

the water jacket. In boring out cylinders for larger pistons, the operator must proceed very carefully, unless he is experienced in this kind of work. There is bound to be some variation in the castings of different cylinder blocks, even in the same make of engine, and therefore the condition of the particular block in question will have much to do with determining to what extent the cylinders can be safely bored out. Cases have been known where Ford cylinders have been bored out $\frac{1}{8}$ in. larger than the present diameter of the cylinder opening, but we should think that the walls would have been considerably weakened in cutting away so much metal.

INFORMATION ON RACING CARS Manner of Fastening Counterweights on Hudson

Independence, Kan.—Editor MOTOR AGE—How are the counterweights fastened to the crankshaft of the Hudson super-six?

2—Would an engine such as Barney Oldfield's Special be successful if the cylinder block and sleeves were made of cast iron?

3—Illustrate and describe the operation and location of the valves and spark plugs of the Stutz racing engine.—F. C. Newton.

1—This is shown by the illustration in Fig. 8.

2—Yes.

3—A sectional view of the Wisconsin engine used in the Stutz racing cars is shown in Fig. 10. As will be noted the valves

are placed directly in the head of the cylinders, no valve cages being used. Two valve springs are used, one inside the other. This is done so that in case the main valve spring should break, it will not let the valve fall into the cylinder. There are four valves to a cylinder, two intakes and two exhausts. One camshaft is used, which operates the valves by means of short forked rockers, one rocker operating two valves. The camshaft which is placed on top of the engine is driven by spur gears inclosed in an oil-tight aluminum housing.

The illustration also shows the location of the spark plugs, there being two to a cylinder. They are mounted in a horizontal position and so located that the points of the plug are immediately below the valves in the cylinders. Current is supplied by a magneto.

TRANSFORMING CAR FOR SPEED Not Advised to Undersling Frame of This Motor Car

Mangum, Okla.—Editor MOTOR AGE—Publish a sketch showing a Flanders 20 converted into a speedster.

2—What will be necessary to obtain speed from this car? What type of high tensions magneto would you advise?

3—Would you advise Atwater Kent ignition? (b) A special camshaft? (c) Perforated pistons?

4—What would be needed to undersling this car?

5—Will Ford wire wheels fit this car with a few changes?—J. H. Wigham.

1—MOTOR AGE has published numerous suggestions for converting old cars into speedsters and if you will look through the issues of the last few months, you can undoubtedly find something in the way of designs and construction that will assist you in determining what might be done with your car.

2—There are a lot of things which can be done to make a car fast. To begin with, the engine might be gone over from top to bottom and changed in various ways. For one thing, the reciprocating parts, such as the pistons, connecting rods, etc., can be lightened by installing aluminum alloy pistons and drilling the connecting rods somewhat. The bearings of the engine must also be looked after to make sure that they are in proper shape and get sufficient oil. The latter is very important, for it is a well known fact that many of the high speed creations often fall by the wayside owing to insufficient oiling. Although the

oiling system on the car you mention is automatic in action, you would be far better off to install some kind of a pump system, with leads to the main bearings, insuring a positive lubrication of these.

Other things you might do to the engine is install larger valves, larger carburetor and fit a camshaft which is equipped with cams of a higher lift. With such a camshaft the valves are held open longer. A high-tension system of ignition might also be substituted for the present ignition system. Also the ignition should be advanced much more than when a car is used for ordinary speed. The cooling system should be gone over and if necessary a new radiator fitted of larger capacity to take care of the excess heat generated when an engine is used for racing. Check up on the valve springs and if they seem to have lost their temper install new ones. This

For the Ultra-Motorist

Below are offered three clever designs for those motorists who want something radical in the way of car construction. At the right is shown a four-passenger speedster with a boat-shaped body. Note the ventilator in the cowl and the novel construction of the windshield. The seats of this car are intended to be placed upon rollers, making it easy for persons of different heights to drive in comfort. The passenger seats are also made to turn completely around, thus giving the car a social atmosphere.

At the left is shown another four-passenger speedster with distinctive features. Attention is called to the odd shaped windshield and the headlamps, the latter being patterned after a 42-centimeter shell. The rear seats are divided by a partition having a removable top which is upholstered in the same manner as the seat backs. Removal of this top discloses a compartment for vanity articles.

The nobby roadster shown in the center is normally a two-passenger, but can be converted into a four-passenger car by pulling out the extra seats which fold into the sides of the car body. The windshield of this car is built-in, being part of the cowl. The triangular shaped affair on the running board is a combination tool box and foot rest for the passenger using the extra seat.

part applies chiefly to the exhaust valves.

Needless to say, the clutch must be in perfect order so that no power is wasted in slippage. Any lost motion throughout the drive system must be eliminated by fitting new bearings and bushings. Of course, the rear axle gear ratio should be changed and if the rear axle shafts are found to be bent resulting in the wheels wobbling, new ones should be installed, unless the old ones can be straightened.

3—The Atwater Kent system of ignition is entirely satisfactory for this, but if you are planning to use a magneto, any one of the types now on the market will give you good results. (b) Yes. (c) Yes.

4—To undersling this car would mean a lot of work and we do not think that you would gain anything in speed by doing this. You would have to make special frame hangers to be used in attaching the springs to the frame and countless other things would have to be changed before you get the spring suspension where you want it. Better leave the front springs as they are and change the rears by making a frame extension giving a kick-up over the rear axle and then attaching a semi-elliptic spring that is very flat. This ought to give a good riding car. After lubricating the springs wind them with fish cord. The latter will act as shock absorbers, aiding greatly in dampening out road irregularities.

5—It is likely that wire wheels intended for Ford cars will fit these axles without a great deal of changing.

Ammeter on 1915 Grant

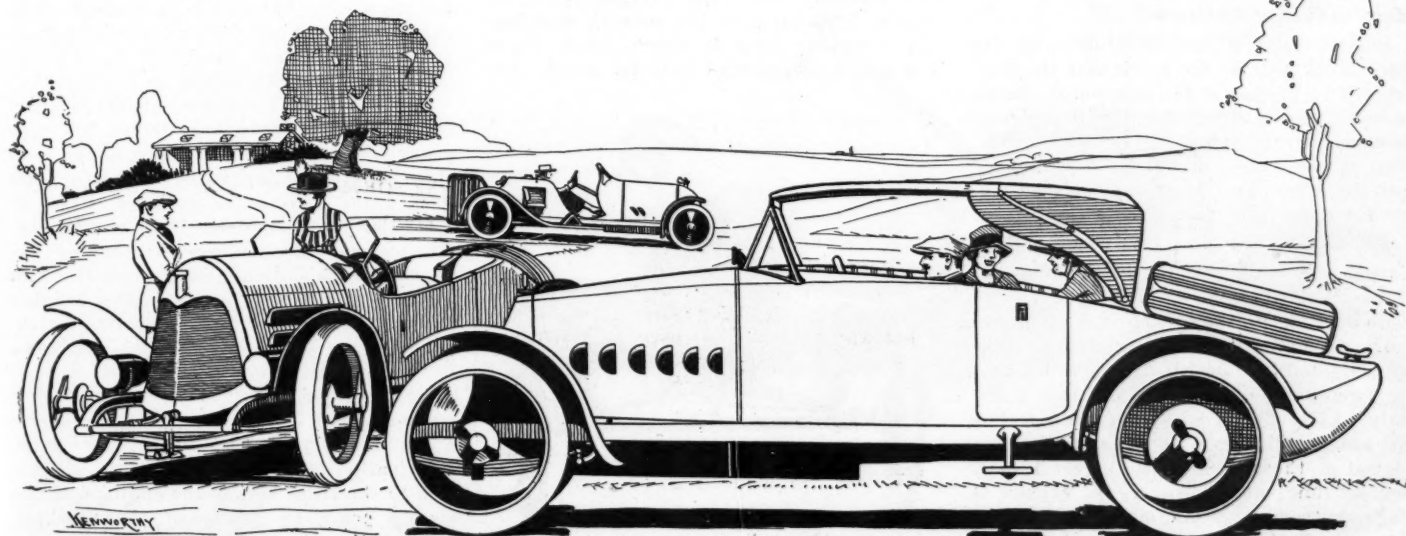
Berwick, N. D.—Editor MOTOR AGE—Show diagram for attaching an ammeter on a 1915 Grant Six, model T. My car has no polarity switch.—H. W. Arnold.

A wiring diagram showing the proper installation of an ammeter on the 1915 Grant is shown in Fig. 6. To install it, open the wire leading from the battery positive terminal to the terminal marked Bat. on the lighting switch and install the ammeter. Remove the small wire from the foot switch and attach it to the post Bat. on the lighting switch also.

Westinghouse Generator Wiring

Rochester, N. Y.—Editor MOTOR AGE—Give a wiring diagram for a Westinghouse lighting and ignition generator, type B., 6 volt, Serial No. 1403853.—Charles Brash.

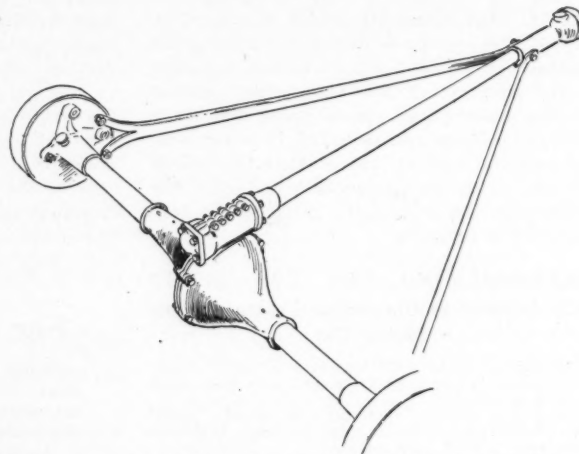
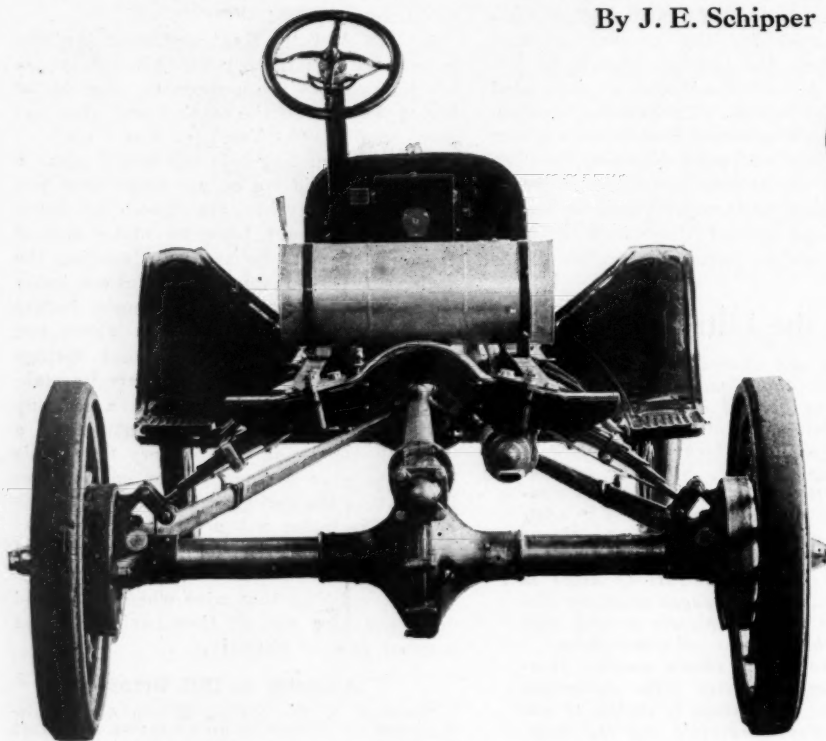
This is shown in Fig. 11.



Ford Truck Driven by Overhead Worm

As Far Back as First Universal It Is the Same as the Passenger Car—Price Is \$600

By J. E. Schipper



An overhead worm drive is one of the distinctive features of the Ford 1-ton truck. At the left is a photograph of the rear

SPECULATION on the part of the public as to what the Ford truck would be like was partially settled in April when *Class Journal* publications gave a brief exclusive story and points which were not cleared at that time are now announced, exclusively, as before. Shipments of the new 1-ton truck are now being made to the various branches of the Ford Motor Co. in different parts of the country and everything practically is ready for the company to enter into active production. The price is \$600. Production now is twenty-five a day and will be put to fifty in the very near future.

Many Advance Orders

Such a demand has been made on the Ford Motor Co. for the truck that the dealers will be limited in the number of chassis turned over to them, and it will probably be many months before the Ford Motor Co., even at the output of fifty a day, can absorb the demand made throughout the country for these light trucks.

The Ford truck, as a study of the illustration will show, is a neat combination of the Ford chassis, which has proven so successful in passenger car usage, and a worm drive truck chassis capable of taking the rated load of 1 ton. As far back as the front universal, the Ford truck is exactly like the Ford passenger car. It has the same engine and the same planetary gearset as those used in the model T cars. Beyond this point, however, the chassis is longer with heavier side members, and the rear axle has been accommodated to take

the overhead worm drive. It is 23 in. longer than the passenger car, having a wheelbase of 123 in.

The Ford Motor Co. will sell this truck in chassis form, because the variety of usages to which it may be put is so great that it would be a matter of great difficulty to turn out a production body that would suit a very large percentage of the users of the truck. By supplying this in chassis form the user can adapt it to his wants at the minimum cost by fitting whatever type of body he desires. Ever since the early announcements made by *MOTOR AGE* that the Ford Motor Co. would produce a truck, the company has been deluged with inquiries from all over the country showing an enormous demand which exists for a low-priced commercial vehicle, which can



How it looks from front

be utilized by the small merchant in carrying out his delivery problems.

While the price has not as yet been settled by the Ford Motor Co. it is known that it will be exceptionally low on account of the big production and easy marketing facilities extended by the Ford organization. The simplicity of the control system to which drivers have been educated by the extended use of the Ford T cars, renders this a vehicle which can readily be placed in the hands of an average motor car driver.

The distinctive features of the Ford truck, aside from its use of the model T engine, and the planetary gearset, is the overhead worm drive, use of solid tires in the rear and pneumatic tires in front, and its electric headlight equipment operated from the Ford magneto in the same way as they are now being furnished on the Ford passenger cars.

Using the same powerplant as they do on the passenger car, no special provision for production has had to be made for the engine in the Ford factory. It is a four-cylinder block unit, with $3\frac{1}{4}$ by 4 in. L head cylinders with valves on the right.

The crankshaft operates on three bearings and the camshaft is driven by spur-gears. The intakes and exhaust are cast separately. Cooling is by thermo-syphon with a fan behind the radiator, which is a tubular type. Ignition is by single, low-tension magneto incorporated in the fly-wheel, and this same magneto operates two electric headlights. The tail and sidelights are oil. The carburetor is a Holley instrument having a hot-air fitting which clamps over the exhaust manifold, giving a complete supply of heated air for cold weather evaporation. There is a dash carburetor adjustment controlling the needle valve. Lubrication is by gravity with the oil carried to the front end of the engine and the timing gears by means of the flywheel, through the oil tube, after which it returns

by gravity to the flywheel casing in the crankshaft.

The clutch is a multiple disk in oil, delivering the drive to a two-speed planetary gearset in unit with the engine. From here the final drive is by means of a propeller shaft and top worm. The ratio in the worm gear is 7.25 to 1, giving a total gear ratio in low of 19.9 to 1, and a total radius in reverse of 29 to 1. From the worm the drive transmission passes through the bevel gear differential and semi-floating rear axle to the rear wheels.

The propulsion stresses are taken through radius rods which are fastened by means of pivot connections at the outer ends of the rear axle and through the tube, which surrounds the propeller shaft. The driving torque is taken through the torsion tube which surrounds the propeller shaft. The springs are the same as those used in the Ford passenger car excepting that they are made heavier in the rear to withstand a great load. This is a transverse type having an arch in the center.

The tire equipment is solid in the rear and pneumatic in the front, in both cases the tires being of the single type. Those used in the rear are 32 by 3 in. and those in the front are 30 by 3 in. The wheels are wood artillery type with oval spokes and the brakes are the same as in the Ford T passenger car with the service brakes on the transmission, and the hand brake on the rear wheels. The transmission drive-shaft brake is an external contracting type and the hand brake is an internal expanding of the rear wheels.

The steering gear is mounted on the left and control system is the standard Ford layout with three pedals and the brake lever.

TO DEMONSTRATE LEONARD

Jackson, Mich., July 19—A demonstration of the Leonard 4-wheel drive farm tractor will be held tomorrow. The tractor first will give a plowing exhibition and then will do a series of jobs such as will be encountered in ordinary farm work.

NEW LINE FOR BOUR-DAVIS

Anderson, Ind., July 20—The Bour-Davis Co., which has moved to Anderson, Ind., as previously announced in *MOTOR AGE*, will discontinue its present models at \$1,250 and will produce a new line including a sedan at \$1,800 and a roadster and touring car at \$1,500.

FORD TRACTOR PLANT ADDS

Dearborn, Mich., July 20—Henry Ford & Son have begun the erection of an exten-

sive addition to their present foundry and machine shop, to cover the land south of the present buildings.

The new buildings will be of one story, with walls heavy enough for more, and will extend over the end of the old clay pit, which has been filled to make room. Several smaller buildings are to be built along the railroad on the north side of the tractor plant grounds, but definite announcement can not yet be made. Activities at the plant have created a demand for more extended equipment, the present output exhausting existing capacity for production.

\$1,000,000 FACTORY FOR RACINE

Racine, Wis., July 20—The Racine Auto Tire Co., Racine, Wis., has awarded the general contract for the erection of its proposed new \$1,000,000 plant and work is expected to be put under way about Aug. 1.

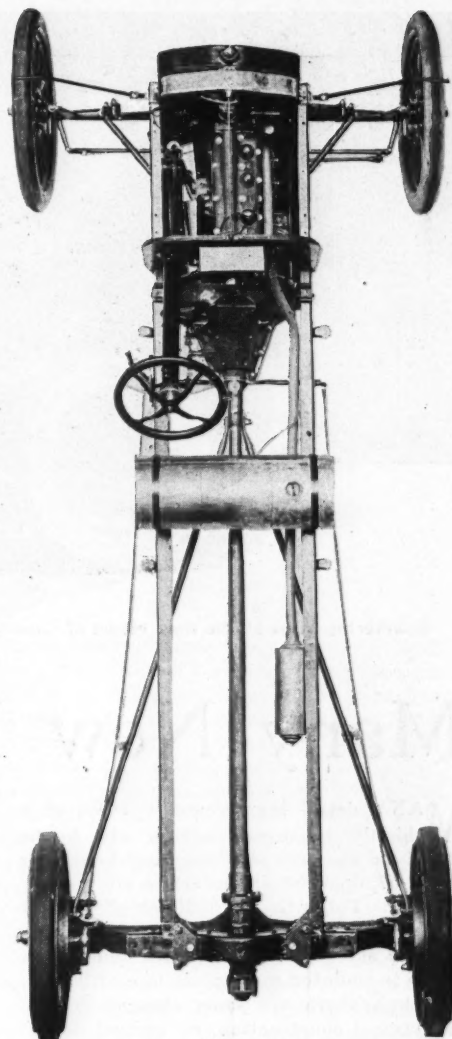
EL AUTOMOVIL AMERICANO

Chicago, July 23—The July issue of *El Automovil Americano*, a motor publication printed in Spanish and published by the Class Journal Co., which also publishes *MOTOR AGE*, is a particularly valuable issue in that it is one that does a great deal to familiarize the Spanish-speaking countries with the automotive industry of the United States. One feature is the common sense advice with regard to the necessity for road construction in all Latin-American countries and the method of building them.

ROSS REVISES LINE

Detroit, July 20—The Ross Automobile Co. has revised its line by substituting a six-cylinder chassis, fitted with bodies of different types, for the eight-cylinder car which it has had on the market for some time. The chassis of the six is the same as that used for the eight with the exception of the engine, which will be a Continental 3½ by 5¼.

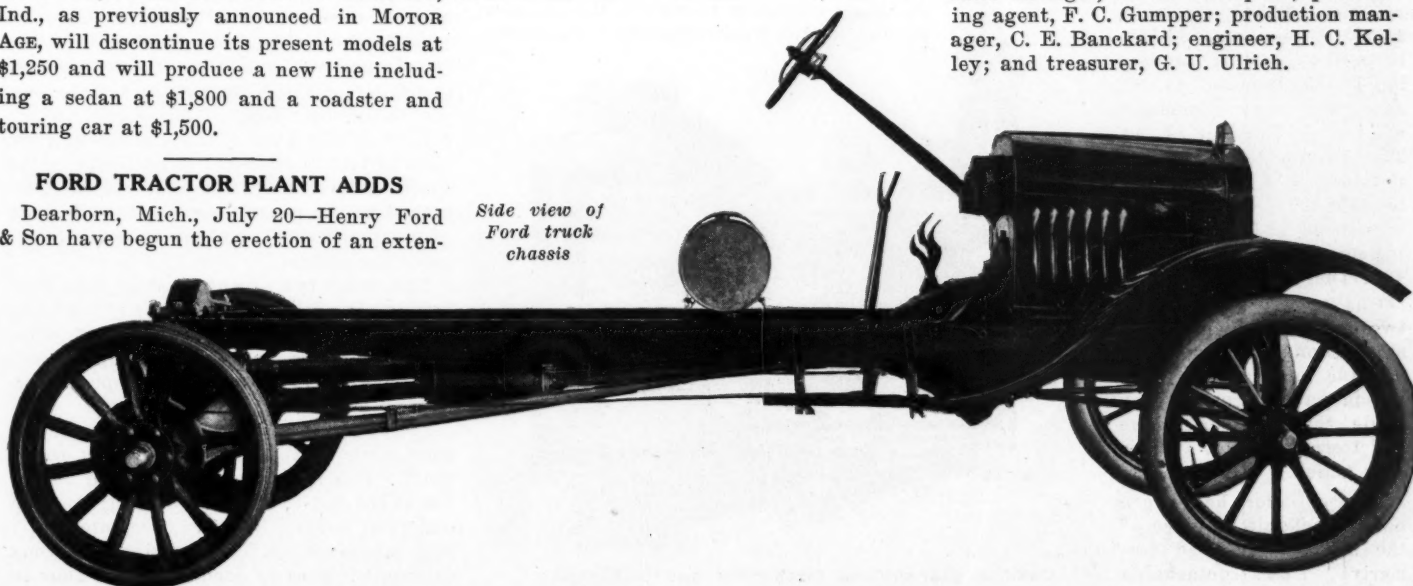
The car lists at \$1,750, and touring car, roadster, sedan, coupe and town car bodies will be supplied. Specifications in addition to the engine are: Multiple disk



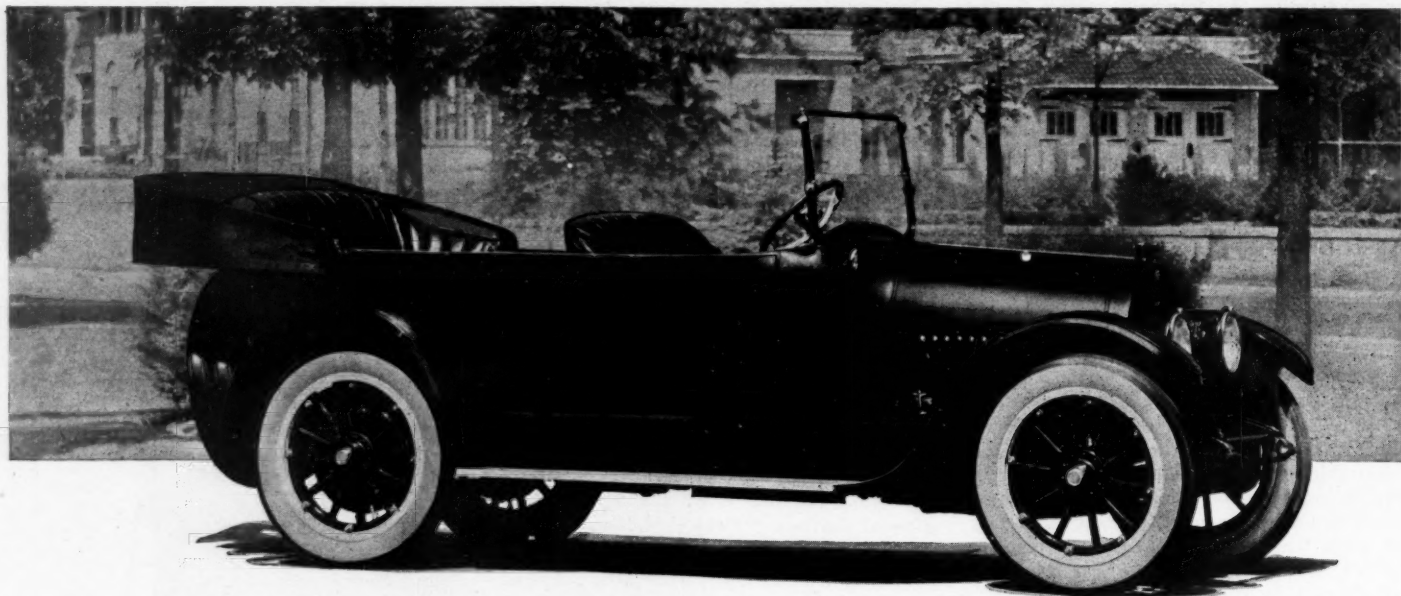
Layout of Ford truck chassis, like the car as far back as the first universal

clutch, floating axle, three-speed gearbox, wheelbase 130 in., tires 35 by 4½ in. and semi-elliptic springs. The car is provided with Atwater Kent ignition, Ward Leonard electric system and American rear axle. Wire wheels are extra.

The new personnel of the company follows: Vice-president, N. R. Wildman; general manager, H. D. W. MacKaye; sales manager, C. W. Thompson; purchasing agent, F. C. Gumpfer; production manager, C. E. Banckard; engineer, H. C. Kelley; and treasurer, G. U. Ulrich.



Side view of Ford truck chassis



Quartering view of the new Model 57 Cadillac, showing the body contours and square door design. The hood and radiator are higher than last year's model

Many New Features in 1918 Cadillac

MANY detail improvements, some of a highly important nature are to be found in the new Cadillac eight-cylinder model 57, upon which deliveries are just beginning. Following its policies of the last three years, the Cadillac company is making one style of eight-cylinder chassis, on which is mounted a complete line of bodies. Although there are some changes in the mechanical construction, no radical departures from previous Cadillac practice manifest themselves in the new eight. The body line has undergone a complete revision and the purchaser has the choice of ten styles ranging from the standard seven-passenger touring car to the town landaulet, which has a 132-in. wheelbase and sells for \$4,250. The seven-passenger Cadillac touring is priced at \$2,590. Interposed between these two models are the phaeton at \$2,590; roadster, \$2,590; victoria, \$3,075; brougham, \$3,535; limousine, \$4,085; landaulet, \$4,235; Imperial, \$4,285, and the town limousine which is listed at \$4,100. The touring car, phaeton roadster, victoria and brougham have a 125-in. wheelbase and the remaining five models, 132-in. Three of the previous models have been dropped and two added. The club roadster, seven-passenger convertible and coupe of last season have been dropped, while the town limousine and town landaulet are the ones added.

The cylinder heads are now detachable in place of the solid heads used formerly. This detachable

head has the advantages of making it easier to remove carbon by scraping and also renders it more easy to reach the pistons and valves without removing the entire cylinder block. The oil filling well is now located on the fanshaft housing at the front of the engine instead of the center of each cylinder block. Ball bearings of the annular type replace the ball bearings of the cup and cone type at the upper end of the distributor shaft. The splash pan at the front end of the engine has been carried back just beyond the rear end of the oil pan. This prevents cold air from striking the crankcase, and causing a tendency to solidify the lubricating oil in cold weather. There are now also holes through the pan to permit the easy removal of the drain and level plugs.

Revised Cooling System

The cooling system has been revised slightly in order to make repairs better from the service man's standpoint. It is no longer necessary to remove the radiator to take out the water strainers between the

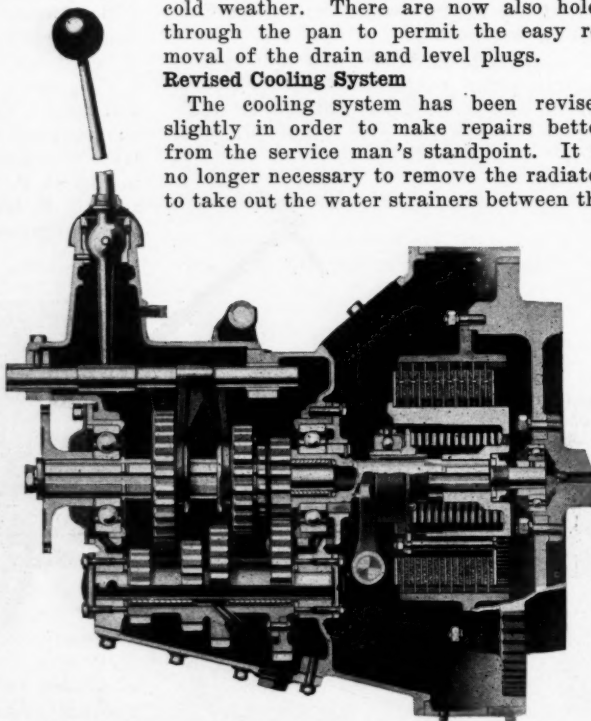
radiator and the water pumps. Plugs for removing these strainers are located at the front of the radiator below the horizontal dust shield.

A pressure relief valve is located in the air line of the gasoline system on the left frame side member below the front floor, replacing the T connection at that point in the previous design. The valve is released at a predetermined point, preventing the pressure in the gasoline system rising above the desired point. This provision is necessary owing to the increased use of casing-head gasoline, which is made from natural gas and which has a tendency to develop high pressure when confined. An indentation in the gasoline tank renders it possible to conveniently reach the gasoline connections in the tank, by inserting a wrench between the tank and tubular cross member in front of it.

By a refined design of the gearbox it has been possible to cut down weight and give a more compact unit, while at the same time shifting has been facilitated. The latter quality has been secured by the new mounting of the shifter forks which operate the sliding gears. The forks are attached to the gear shafts, which in turn, slide in bronze bushings at each end of the shaft. Also the multiple disk clutch is attached to the gearset on a splined instead of a tapered shaft, making it easier to remove the clutch.

The clutch is a seventeen steel plate type having nine driven disks and eight driving disks. There is one coil spring held under 300 lb. compression within the clutch hub and the drive is through a three-speed gearset and a floating spiral-bevel axle.

In the steering gear an improvement has been made at the outer end of the sector shaft. This is tapered and serrated with a nut at the end to hold the steering arm, the latter, of course, being also serrated. By this means the serrations give thirty-six driving surfaces as compared with four in



Cadillac gear-shifting mechanism and disk clutch

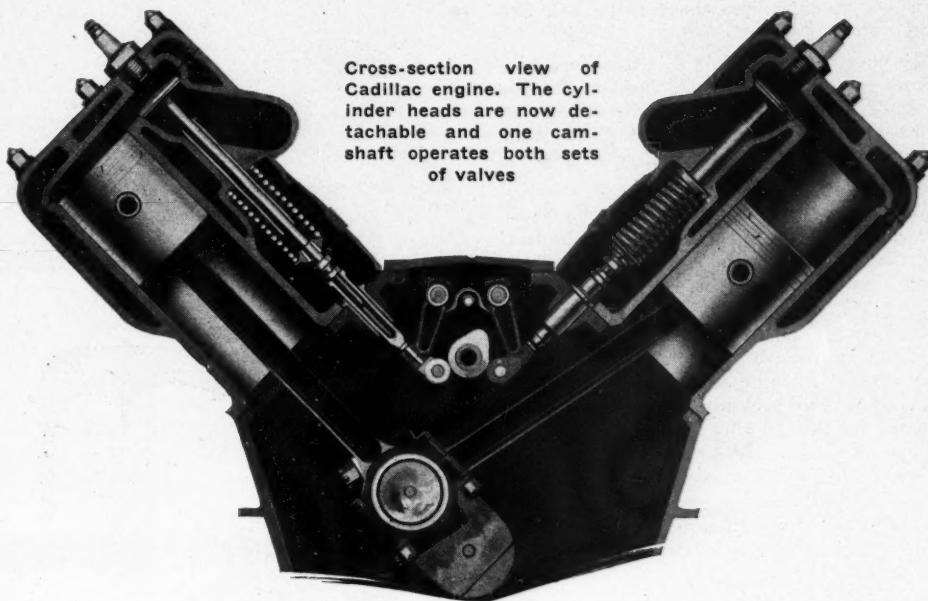
the squared-end construction used in the previous model.

Better lubrication has been provided on the type 57 Cadillac by special provisions which have been made to increase accessibility. Two openings, closed by removable covers, are located in the tonneau floor of the touring car and phaeton, facilitating the lubrication of the bearing at the forward end of the rear axle pinion shaft; the rear universal joint and the filling of the two grease cups at the rear end of the torque member. There is a connection at the rear end of the starter gear shaft, which fits the end of an oil gun. This was formerly lubricated by an oiler.

Refined Body Lines

There have been some changes in the contour of the 1918 body which give the car a slightly different appearance. On the open cars this is particularly noticeable. The radiator and hood are higher and 2 in. longer, without shortening the body. This has necessitated the use of a new cowl, harmonizing with the radiator. The moulding at the top of the body is $\frac{5}{8}$ -in. wide in place of the $1\frac{1}{2}$ -in. moulding previously used, and moulding $\frac{1}{2}$ -in. wide is used on the door, hood and fenders. The doors are of square design and the fenders are provided with four wires to stiffen them instead of two. There is more leg room in the driver's compartment, the angle of the toe board having been increased. The seat backs are also higher and more comfortable.

The cowl louvres have been decreased in number and set at an angle of 6 deg. to be parallel with the windshield. They are now provided with shutters to close the air exits in cold weather. Another refinement for cold weather driving is a provision for closing the 1-in. space between the hood and hood shelf. The upholster-



Cross-section view of Cadillac engine. The cylinder heads are now detachable and one camshaft operates both sets of valves

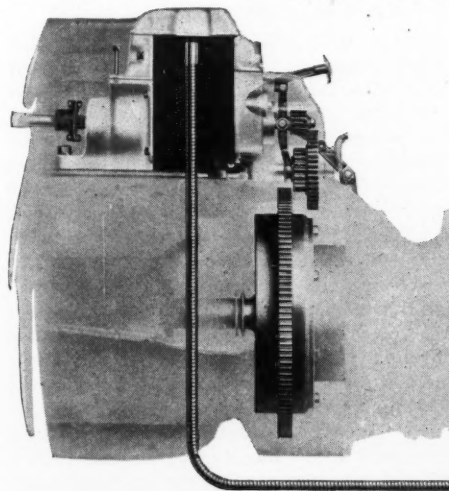
with the side quarters lined, and the side curtains tagged to facilitate putting them up quickly.

Refinements in the inclosed Cadillac bodies have been carried out to a marked extent. The inclosed line comprises three limousines, town car, and brougham. The striped velvet upholstery used in these is laid in French plaits over the seat cushions and backs and lower side quarters below the arm rest. The upperwork, ceiling and doors, are dressed in plain and unplaited velvet of the same color as the lighter background of the striped material. A notable feature is the absence of lace or braid, the binding material being the same as the plain upholstery. The moulding for the doors and windows has an ebony finish and all the metal plate work is given a dull wire brush finish. A carpet hassock of the same color as the upholstery is used instead of a foot rail. There is a new pull-to handle on the door covered with

plain velvet to match the upholstery and these upholstered cords are also used as robe rails. Evidently much attention has been paid to make the body weather-tight and rattle-proof. The windows are crystal plate and the window mountings arranged to allow for expansion and contraction due to changes in temperature. The driver's compartments are protected and the locking system has been simplified as far as possible.

Town Car Differs

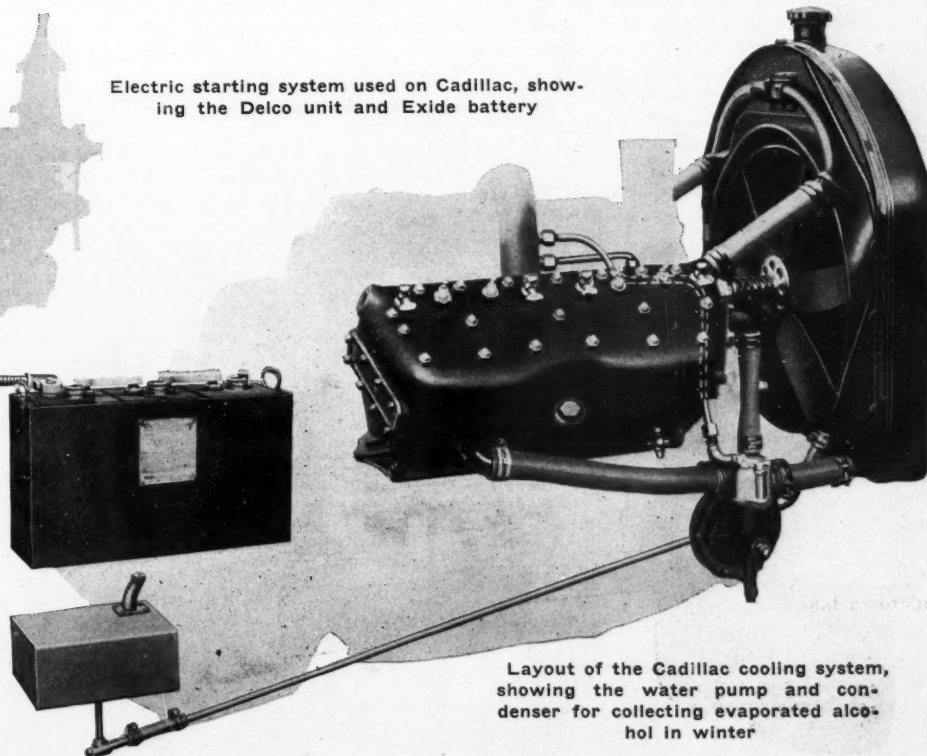
The two body styles added, the town car and the town landaulet are designed to fill points indicated as desired. The town car is similar to the limousine with the roof of the driver's compartment eliminated. The body is approximately 4 in. narrower than the standard limousine, and the partition window is in one section, without the narrow end windows used in the limousine. The town landaulet is like the town car, except for the landaulet feature which allows



Electric starting system used on Cadillac, showing the Delco unit and Exide battery

ing is hand-buffed dull long-grained black leather.

A new feature is the tilting headlight reflector. By means of a small lever on the left side of the steering post the headlight reflector can be tilted, throwing the light down on to the road where it is most needed in passing other vehicles. There is also an automatic top raising device, which was fitted on the phaeton last year. Powerful springs are located in the main bow socket. After the top has been manually raised a few inches, these springs take the load and automatically open the top the rest of the way. The top material is black Pantasote,



Layout of the Cadillac cooling system, showing the water pump and condenser for collecting evaporated alcohol in winter

the passenger compartment to be conveniently opened.

In equipment there is a better horn button and a new tire pump. The horn button operates more easily and will sound the horn when it is touched in any position. The new tire pump is a Kellogg, located on the left side of the gearbox.

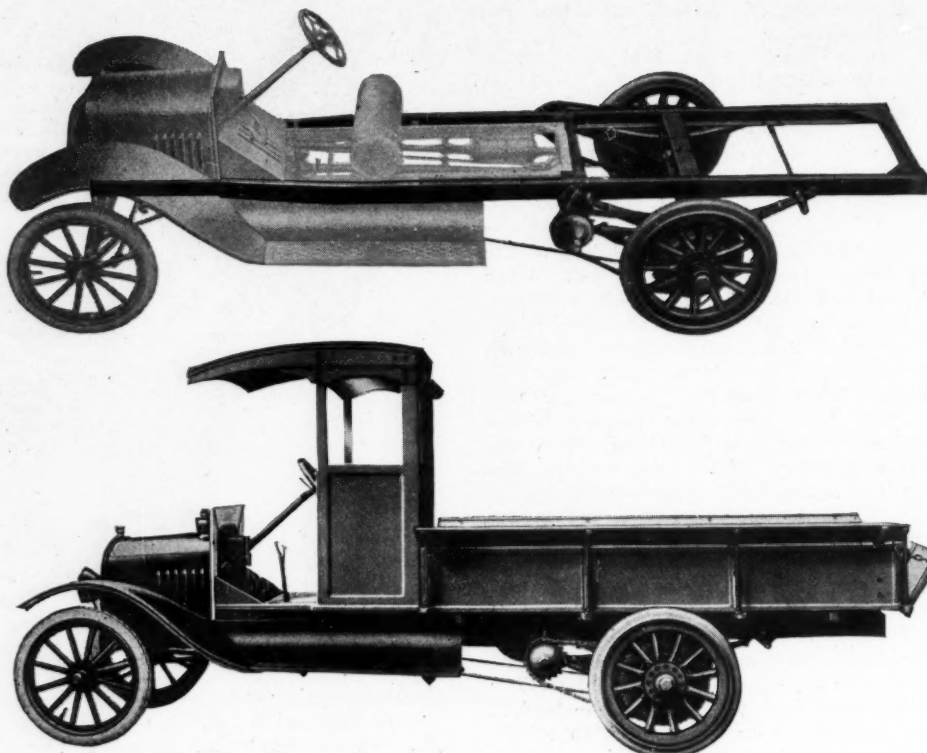
With the changes noted above the Cadillac car remains the same in its mechanical details as last year's model. It has the well-known eight cylinder V-type engine with a $3\frac{1}{8}$ in. bore and $5\frac{1}{8}$ in. stroke. The connecting rods are the forked end type, and the valves are on the inside of the V, operated by a single central camshaft. Gasoline feed is by pressure, the carburetor being a Cadillac. Electrically the car is equipped with thermostatic connection. A Delco ignition lighting and starting system. Cooling is by pump with thermostatic connection. There is also a condenser to conserve the alcohol supply used in winter.

Graham Truck Unit

FOR the truck attachment buyer who prefers to purchase the unit complete with cab and body, a solution is offered in the presentation of a complete attachment unit made by Graham Brothers, Evansville, Ind. The trade name of the new outfit is Graham Brothers All-3, Unit-Cab-Body. It fits the Ford chassis and comes all ready to attach at a price of \$385. This includes a choice of either express or stake body with the cab. The unit itself is practically assembled before shipment. The frames, axles and springs are completely assembled, the wheels and sprockets only being removed. By use of the attachment the resultant wheelbase becomes 125 in., with a deadweight carrying capacity of 2000 lbs. The weight of the Ford chassis, with the truck unit, but without body, is 2150 lbs. The recommended road speed is from 12 to 20 m.p.h.

The frame of the Graham unit is made of channel steel and surrounds the Ford frame, to which it is bolted in front, sides and rear. The rear axle assembly of the Ford becomes a jackshaft, rigidly held in place by bearings designed for the purpose. The Ford rear wheels are removed and in their place sprockets are attached to the axle shaft ends. Heavy artillery type wheels are placed on the unit with tires 32 by $3\frac{1}{2}$ in. The latter are pressed on. The brakes, conventionally placed on the rear wheels, are 14 by $2\frac{1}{2}$ in. They are of the internal-expanding type, Raybestos lined. The service brake remains the same as that on the standard Ford car.

Semi-elliptic Hess springs are fitted, being 2 in. wide and 42 in. long. There is also a semi-elliptic relief bumper cross spring. All sprockets are of steel, mill cut and interchangeable. Correct alignment of the jackshaft and rear wheel centers is assured by the use of radius rods fitted with



Graham truck attachment with and without cab and body

an adjusting bolt. The drive is by double roller chain, said to have an ultimate strength of 19,000 lbs. The rear axle is of drop-forged steel $1\frac{3}{4}$ by $2\frac{1}{4}$ in. tested to 4000 lbs. The axle collars and hub bases are forged integral with the axle. Over-size Bock roller-bearings are used.

Analysis of the cab shows the sills or base to be made of heavy ash, while the side and top rails are of cottonwood. The latter is also used in the cab panels. The roof is covered with water-proofed oiled duck. Heavy gage metal is used in the sides of the cab. The back curtain, also of oiled duck, is fitted with a large mica light and the driver's seat, together with the back, is covered with imitation leather.

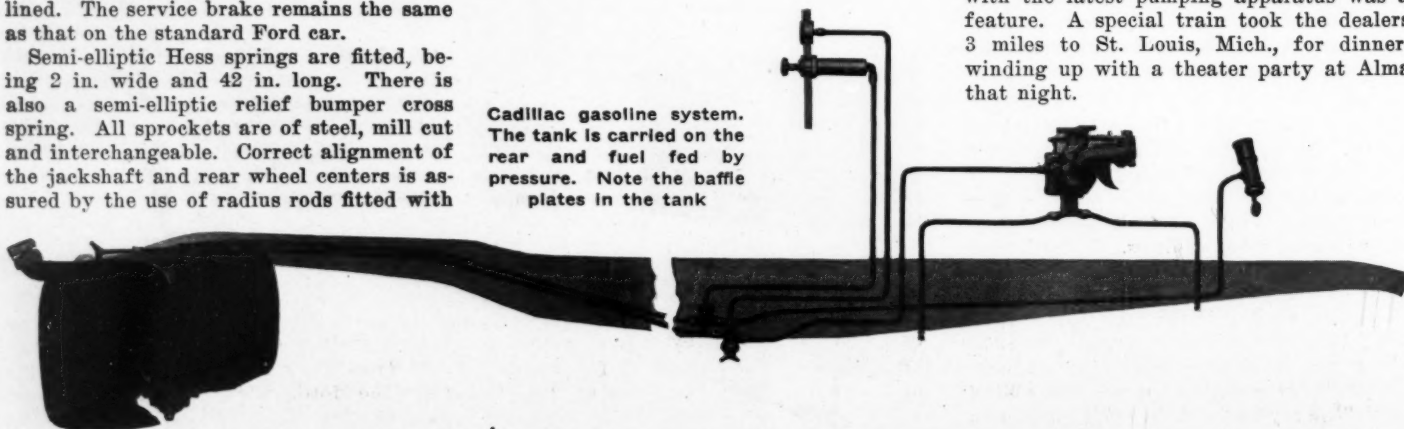
The express body is braced with iron; the sills being of ash. The floor of this body is of oak laid on heavy ash cross beams. The side flare boards and panels are of cottonwood, the latter being 12 in. high on the inside. An extra heavy end gate is fitted, provided with the usual chain. This type of body provides a loading space of 106 by $45\frac{1}{2}$ in. The stake body is also heavily braced and ironed, with ash sills,

bars, oak floor and heavy bolted pockets for the stakes which are of hickory, 36 in. high. The loading space of this body is 55 by 112 in. The finish of the Graham Brothers unit is carried out in a rich gray or royal blue, appropriately striped. The company states that it is prepared to furnish bodies of special design to fit the truck attachment, when this is desired.

REPUBLIC DEALERS GATHER

Alma, Mich., July 20—Two hundred Republic dealers are meeting at the factory of the Republic Motor Truck Co., Inc., here this week. It is the first of a series of dealers' conventions the company plans to hold. Territorial divisions are not observed at this first meeting and visitors came from the Atlantic and Pacific coasts and from Louisiana and Texas as well as from Illinois and Michigan. The Republic factory representative in Australia and New Zealand, W. Crowle, is here from Adelaide for the meeting. The dealers were taken through the plant Tuesday, and all the models were reviewed. A demonstration of Republic fire trucks completely equipped with the latest pumping apparatus was a feature. A special train took the dealers 3 miles to St. Louis, Mich., for dinner, winding up with a theater party at Alma that night.

Cadillac gasoline system. The tank is carried on the rear and fuel fed by pressure. Note the baffle plates in the tank





The Motor Car Repair Shop



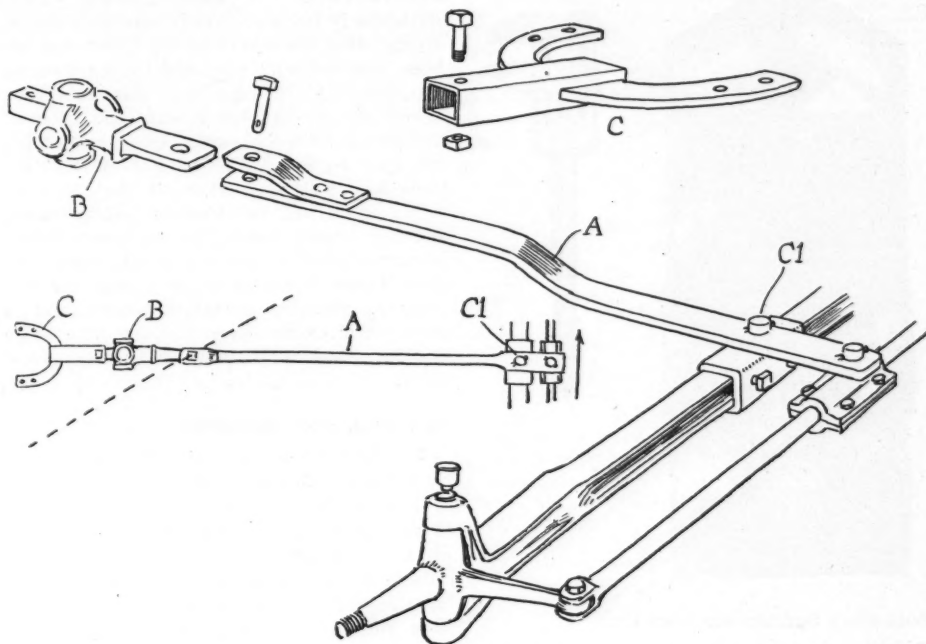
Making a One-Man Tow Bar for Trailer

IN last week's issue of MOTOR AGE I was described a running gear intended for a two-wheel trailer, utilizing Ford parts chiefly. In the accompanying illustration is shown the method of building a one-man tow bar which makes it possible for one man to drive a car which in turn is towing a four-wheel type trailer, presuming that the latter is using a Ford front axle in the construction of its running gear. It is obvious that if a car is towed in the ordinary way, someone is required to steer the second car, otherwise it would not follow properly. A four wheel trailer could be made with a running gear using as its front axle the ordinary Ford front axle. Suitable braces could be provided to stiffen the whole by using the holes in the spring perches with which the Ford front axle is fitted. The rear axle might also be made out of a Ford front axle by securing the spindle connecting rod rigidly to the axle itself, thus preventing the wheels from turning. Inasmuch as the builder will have to determine the way in which he wants to shape the body and frame of the trailer to suit his particular needs, no attempt will be made to do so here, only the construction of the one-man tow bar being described.

To Prepare Car

To begin with, the car which is going to do the towing will have to be prepared in the following way. The spring clip retaining nuts on the rear spring are removed and a semi-circular shaped bracket as shown at C made to fit the rear end in the same manner as was done in the construction of the two-wheel trailer described last week. It is not likely that a bracket like C can be had without making it special and the metal will have to be heated to a red heat so that it may be bent. At B is shown a universal joint such as is used on the Ford car and which has outlived its usefulness. The male member of the joint is attached to the bracket C by means of a short piece of squared tubing notched at one end to fit the bracket as shown. It is riveted to the latter. The joint is secured in the tubing by a bolt or pin which passes through both. Into the female member of the joint is fitted a piece of square stock metal, the end of which has been flattened out on an anvil. This is also held in place in the joint member with a pin. A hole is drilled in the flattened end to which the tow bar is to be attached when desired. This completes the parts that are to go on the car which does the hauling.

The tow bar shown at A is made of steel, heated and bent to the shape shown. At its forward end a short piece of metal is attached with rivets or bolts. Holes are then drilled in both pieces, the holes being the same size as the one drilled in the part that was fitted into the female member of the joint. A hardened pin should be used to couple the units together and if a great deal of towing is to be done, it may be



How the one-man tow bar is attached to the car and trailer. The universal joint is an old one taken from a Ford car

well to fit bushings in the holes for the pin. The pin itself can be provided with a short length of chain or leather strap attached to the bar A so that it will not become lost. If it is made long enough, there will be no danger of its coming out on the road through vibration. Two holes are drilled in the end of the tow bar which is intended to be attached to the second car or trailer. These two holes should be drilled on centers corresponding to the distance from the center of the axle beam to the center of the spindle arm connecting rod.

The axle used on the trailer is provided with a clamp to act as a pivot, around which the tow bar turns. This pivot is shown at C1. The pivot might be made by welding on a short length of round stock to the clamp partly surrounding the axle. The clamp is fastened to the axle by means of set screws, or if a permanent job is desired, with rivets or bolts. A similar arrangement is made in the case of the tie rod, but the clamp here is made in the form of a sleeve which must be slipped over the rod after having first removed the adjustable forked end which rides on a threaded portion of the rod at the left end. The sleeve is also secured with set screws. It will perhaps be a good idea to fit bushings to the holes drilled in A for the pivot C1 and the pin on the tie rod, because there is bound to be wear in these places.

The action of the one-man tow bar can easily be understood by referring to the illustration. When the car doing the towing turns a corner, as indicated by the dotted line, the tow bar will be pulled in

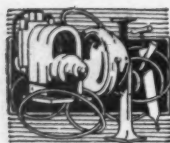
this direction. It will, however, pivot on the point C1 forcing the tie rod in the direction of the arrow. This will turn the front wheels of the trailer in the same manner as though someone were driving the car, and turned it by means of the steering wheel.

EXTENDS BEARINGS SERVICE

Detroit, July 23—When on Sept. 1 the Bearings Service Co. opens six new branches, it will have established, during the first year of its operation, twenty-two branches in the principal cities of the countries from coast to coast. The concern is the authorized national service representative for the Hyatt Roller Bearing Co., the Timken Roller Bearing Co. and the New Departure Mfg. Co. At each branch is a stock that contains bearings of every size and description, not only for cars of recent make but for cars no longer made. The new branches will be located at Pittsburgh, Pa.; St. Louis, Mo.; Omaha, Neb.; Portland, Ore.; New Orleans, La., and Toronto, Canada. C. M. Fox, C. R. Jones, W. C. Hodgson, R. H. Cross, W. R. Herring and A. W. Robbins, Jr., respectively will be in charge.

TO MEET AUG. 7

New York, July 20—Motorcycle engineers will meet under the auspices of the Society of Automotive Engineers in Atlantic City Aug. 7. The place was chosen because the Motorcycle and Allied Trades Association has a convention there Aug. 6-8.



The Accessory Corner



Nathan Comfykit at left, and, top, Kelly adjustable wrench for motorists

Rest-More Springs for Ford Cars

IN the Accessory Corner of the June 21 issue of MOTOR AGE, the price of the half set of Rest-More Springs was given as \$17.50. This should have been \$20.

B-W Coil Tester

There has been placed on the market by the Ballman-Whitten Mfg. Co., 2867 Gravois avenue, St. Louis, Mo., a device for testing Ford coils, which consists of a wooden base upon which is mounted a low reading ammeter, receptacle contact springs in which to place the coil to be tested and adjusted, two binding posts for connecting to a 6-volt storage battery or four dry cells, an adjustable spark gap and a switch for making or breaking the circuit. The coil to be tested is slipped into place and a battery is connected on to the binding post provided on the tester base. The switch is then closed and the ammeter should give a fairly steady reading of about 1½ amp. with a continuous flow of sparks across the spark gap. If the current is lower than 1.2 amp., then the vibrator spring on the coil is weak and should be strengthened. This is done by removing the cross piece that carries the adjustable contact, and noting the distance that the vibrator spring stands away from the coil head. This distance is increased slightly by bending the vibrator spring away from the coil head. If the current is higher than 1.8 amp. the vibrator spring is too strong and stands away too far from the head of coil. In this case, the vibrator springs should be bent inward.

Nathan Comfykit

This is a handy outfit of needles, buttons, brushes, etc., designed essentially for use in the army and navy, although it is equally serviceable for motorists who do a great deal of touring. The case is made of

two-ply olive-drab waterproof auto-cloth and has specially designed pockets which hold each article in place. The kit is fitted with handy loops so that it may be hung up. Every item contained in the Comfykit has been selected with care and they are standard products of leading manufacturers. When opened the kit is 22½ in. by 9 in. and when folded occupies space measuring 2¾ by 5 by 9 in. The weight of the complete kit is 24 oz. Some of the other articles contained in it are a safety razor, shaving brush, comb, mirror, tooth brush, adhesive plaster, sewing outfit, soap box, etc. There is also a large pocket for stationery, pencils, postcards, etc., and a pocket for extra razor blades. The price is \$5. Nathan Novelty Mfg. Co., New York.

New York Foot Supporter

The New York Coil Co., 338 Pearl street, New York, has placed on the market a device intended to relieve the foot and leg of all strain and prevent the irregular application of power to the engine, noticeable in driving over rough roads or bumpy streets. The device consists of two members formed of drawn steel with a rod



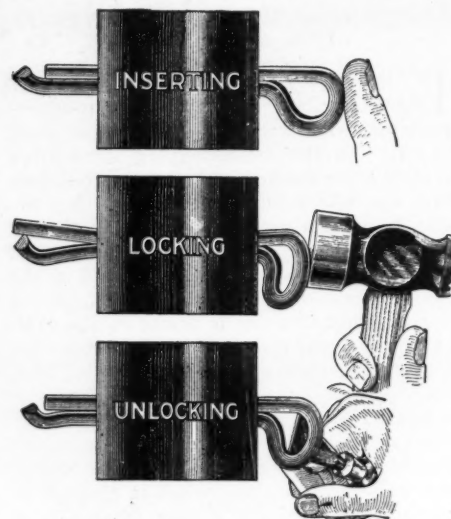
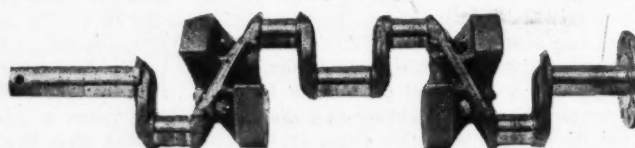
New York foot supporter to make driving easy

running through both pieces so that the top member rocks backward or forward, at the same time carrying the entire weight of the leg and foot, which allows a very gradual application of power and enables the operator to keep the accelerator fixed at any position desired. The spiral spring keeps the upper member in an upright position and means are also provided to raise or lower the device to suit any height of accelerator. The supporter is nickel-plated and sells for 75 cents.

Kelly Adjustable Wrench

A handy form of wrench especially suited to the needs of the motorist has been brought out by J. Kelly, 404 South Kolmar avenue, Chicago. There are only two mov-

Dunn counterbalance weights for Ford crankshafts



How Hammer-Lock cotter pins are secured

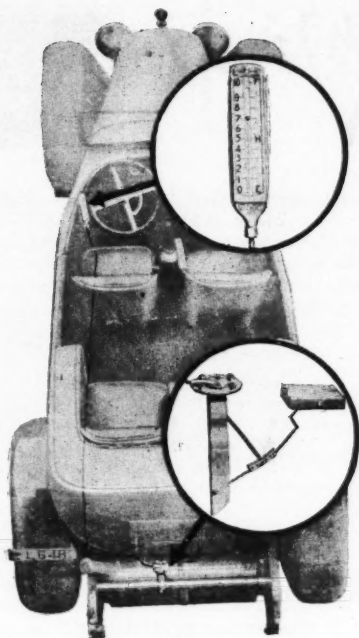
ing parts to this wrench, consisting of the sliding lower jaw and the handle, which merely revolves to give the proper opening to the jaws. A feature of the wrench is that the parallel guides fastened to the top jaw tend to keep the lower jaw parallel with the upper one. Also when a nut is turned by means of the wrench, additional grip is afforded on the nut by slightly turning the handle at the same time. The price is \$1.50.

Counterbalance for Ford Crankshaft

One of the newest accessories for Fords is the crankshaft counterbalance brought out by W. G. Dunn, Clarinda, Iowa. This device consists of four castings which are attached to the crankshaft in pairs. Each pair is bolted together with four bolts and the counter-balancing weights are so disposed that they come opposite the crank throws, being as close to the latter as they can be placed and yet allow sufficient clearance for the connecting rods. It is possible that the method of attaching them may be altered slightly when the device is ready for the market.

New Kaybee Spotlight

The Accessories Supply Co., Los Angeles, Cal., has brought out a spotlight using flexible metallic tubing for support instead of the conventional bracket. This tubing is similar to that used for speedometer cable-casings. The Kaybee spotlight, as it is called, may be thrown instantly in any desired direction. It is of the concentrating type. A thumb switch is conveniently located just in back of the reflector. Connection is made at the dash by means of a small socket connection and bracket combined. A 6-volt, 24-cp. nitrogen globe is



Cole gasoline gage, showing manner of installation

used in the spotlight. The equipment also contains 10 ft. of flexible wiring, fitted with plug and socket, thus enabling the spotlight to be used as an inspection lamp.

Hayes Tire Carrier

This is a tire carrier for Ford and Chevrolet cars. It consists of a flanged metal rim, mounted at the rear of the car and holding the tire in much the manner of a clincher rim. A ridge in this rim presses the bands of the tire out against the rim flanges, holding the tire securely in place, after it has been expanded by means of a lever. The lever may be padlocked in the expanded position and prevents mud and water from splashing into the tire. The carriers come complete and are provided with holes for the number as well as the tail light bracket. The single type costs \$4 and the double type, \$6.—Ongaard Auto Necessities Co., 982 Woodward avenue, Detroit.

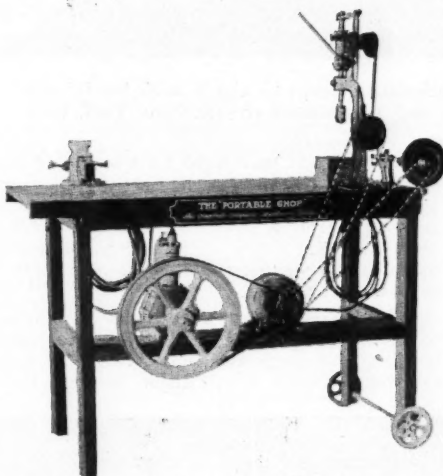
Peniflex Metal Hose

The Pennsylvania Flexible Metallic Tubing Co., Chicago, is marketing the Peniflex

metal hose, variously used in the motor car industry. The distinctive construction of this product consists of a continuous length of special bronze or galvanized steel tape, rolled in a spiral, so that the edges interlock, forming a four-wall construction. As the tape is rolled a groove is formed, containing asbestos packing, which remains fully protected from internal or external wear. It is claimed that this product is lighter and stronger than rubber hose and that it will last for years, the action of oil preserving it instead of destroying. This company offers in connection with the metal hose, the Peniflex side-discharge automatic barrel filter, for use in handling lubricating and heavy oil.

Overholt Portable Shop

This consists of a work bench on which is mounted a combination of tools and machines commonly used for general repair work in the garage. The bench itself is 20 by 48 in. with castor wheels on the front, making it easy to move from place to place. A $\frac{1}{4}$ hp. motor is used to drive the different units and is meant for a 110-115 volt circuit. The air compressor has a working capacity of about 175 lb. and will inflate the largest tire in 2 min., it is said. Fifteen feet of air hose comes with it. The drill press will take drills up to $\frac{3}{8}$ in., and

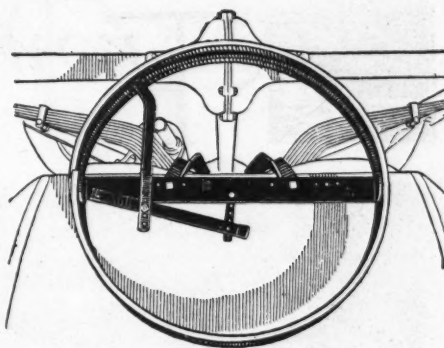


Overholt portable shop, showing disposition of units

drills to the center of a 9-in. circle. The emery grinder carries wheels up to 6 in. in diameter and $\frac{3}{4}$ in. face. One wheel, 5 in. by $\frac{1}{2}$ in. face is furnished. The spindle is fitted to receive a drill chuck, but the latter is not furnished with the outfit. Polishing, buffing, etc., can be done on the small lathe which will take 10 in. between centers. A substantial machinist's vise is mounted on the bench and the jaws of this will open 3 in. The weight of the portable shop is about 225 lb. and it is sold as a complete unit or the parts can be had separately. The price is \$160. The Overholt Co., Galesburg, Ill.

Campbell Hammer-Lock Cotter Pin

The American Chain Co., Bridgeport, Conn., has issued a new booklet and price list of its Hammer-Lock cotter pins especially interesting to the trade. These cotter pins are handy for quick repairs on motor cars and all operations for setting the



Method of attaching Hayes tire carrier

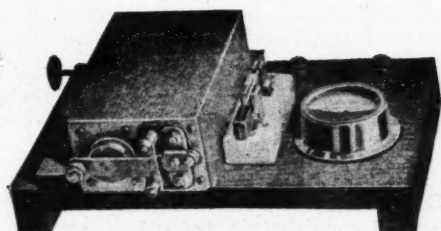
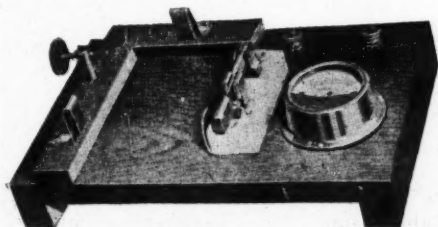
pins are done from the eye end. Thus the pins may be easily locked in places where the points are inaccessible to spread in the manner necessary with the conventional type of cotter pin. To lock this pin it is only necessary to drive on the head or eye until the points are of equal length. This will partially flatten the eye and force the shorter branch forward so that its end will ride up over the upturned point of the other branch. These pins can also be used over again, it is said. A variety of 3000 pins, sizes most commonly used in the motor car industry, is packed in a wooden box and sells for \$1.50. This is called the garage assortment. A handy motor car kit assortment containing an assortment of one hundred pins in a screw top nickel-plated box is also furnished.

Bower's Coil Protector

This consists of a waterproof substance to be poured between the dash and body of a Ford car and which, upon solidifying, forms a protection for the coils against rain. The material is put up in a container and a vulcanizer, spirit lamp or any source of heat may be used to melt it. It is said that the substance will harden almost as quick as it is poured. In applying it the bolts which hold the body of the car to the dash are loosened and the resultant crack is filled with the melted liquid. Usually a thin strip of cheese cloth is placed between the parts and pulled down tight as far as possible to prevent the coil protector from running through past the edge of the body. It is claimed that this substance will withstand all vibration and jars from driving and has the flexibility of rubber, but will not peel or crack. The price is \$1. C. J. Bower, Galesburg, Ill.

Macbeth Headlight Lens

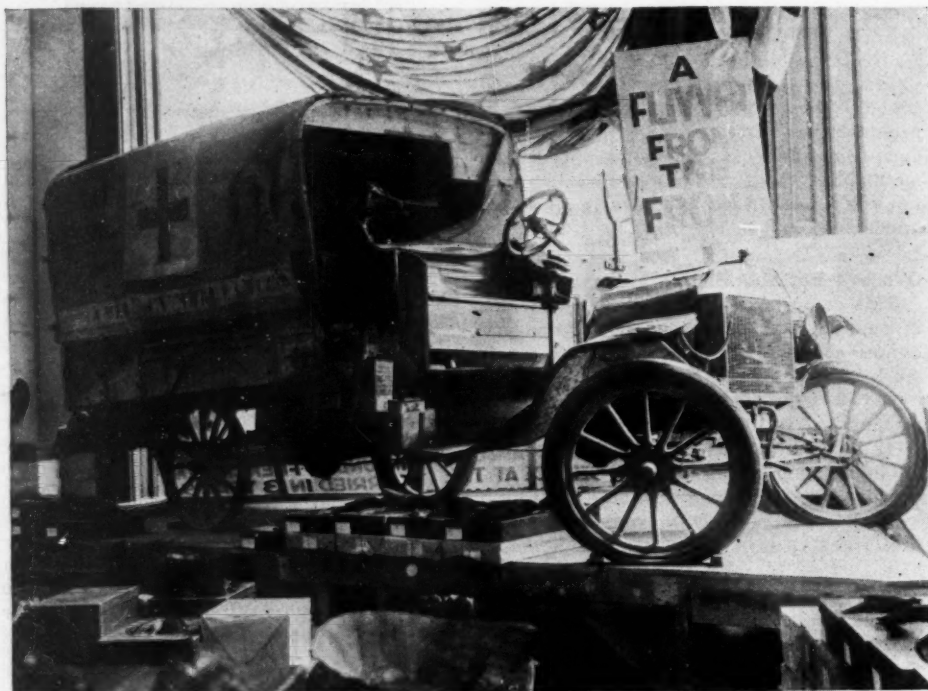
The Macbeth-Evans Glass Co., Pittsburgh, Pa., has added to its line of products a new motor car headlight lens known as the Macbeth Lens. One of its outstanding features is an attractive green enameled glass visor, built integral with the lens, by which all upward rays of light are redirected down, thereby making good use of otherwise wasted light. The front surface of the lens is divided into five horizontal prisms. Each is inclined at an angle scientifically determined so that the light is bent at just the correct angle. The inner section of the lens is made up of concave sections which spread the light laterally, thus providing the side lighting essential for country driving and for turning corners.



B-W coil tester with coil in place for testing



From the Four Winds



A Ford which was used by the American Ambulance Corps on the French battlefield on exhibition in a shop window at Broadway and Washington streets, New York City

DELAWARE Proposes Traffic Census—The new Delaware state highway commission has decided to take a traffic census of the state, so as to determine what roads are used most and where road work is most imperative.

Jail Intoxicated Wisconsin Driver—Two days after the Wisconsin Legislature enacted a new statute placing a fine of not more than \$100 or a jail sentence of not more than six months upon the act of driving a motor vehicle on the public highways while intoxicated, the driver of a light delivery truck was convicted and sent to the house of correction for three months in the police court at Milwaukee. The case also involved the use of a car without the owner's consent, as the testimony showed. The court announced it would deal strictly with intoxicated drivers in the future. The old law did not permit of jail sentences for the offense.

Wisconsin Registers 146,500 Cars—A total of 146,500 cars were registered by private owners of Wisconsin up to the middle of July, or approximately 31,000 more than were registered all of 1916. The 150,000 mark is expected to be reached by the close of the month, or before, and the secretary of state, who is in charge of registry, predicts that by the end of the year a total of 165,000 licenses will have been issued to private owners. The contract for 1918 plates already has been awarded to guard against shortage. The specifications call for 150,000 pairs of plates, in cream and black, and will cost 16 cents a pair.

Motor School to Open—The motor car work shop and exhibit of parts in the shop for the Y.M.C.A. Motor Mechanics' School, St. Louis, Mo., has been completed and the classes are being organized. The present indications are that the enrollment will exceed expectations. A very thorough course is planned and in the

fall classes will be opened for women. Some difficulty has been experienced in explaining to applicants that this is a thorough course and not merely a superficial course for drivers. But with a few eliminations, the applicants have accepted the obligation to undertake the work.

Pennsylvania Road Uses Truck—In order to avoid the necessity for stopping passenger trains at the company's shops, near Wilmington, Del., to take on and discharge mail mat-

ter and parcels, the Pennsylvania Railroad Co. has placed a White truck in service between the offices and the shops, which are 3 miles apart. Heretofore a number of trains, running between Philadelphia and Wilmington, had to be stopped each day to handle the mail, but the truck, which runs on a regular schedule, makes this unnecessary and saves time for the trains.

Cutler-Hammer Gives Fellowship—The Cutler-Hammer Mfg. Co., Milwaukee, Wis., maker of the C-H magnetic gearshift, has made the gift of a fellowship of \$400 for research work in physics to the University of Wisconsin, Madison. The aim is to initiate cooperation between the industries of the state and the university in working out problems of a scientific nature.

Round Up Traffic Offenders—On the first night of a campaign against traffic ordinance violators in Toledo, Ohio, 147 drivers were arrested. The Toledo Automobile Club is cooperating with the police and ten of the members are actively engaged in the work. By the Toledo system a red tag is attached to the car, and a stub bearing the number of the car license is sent to the police station. Warrants are sworn out against those not appearing on the morning of the day following the arrest.

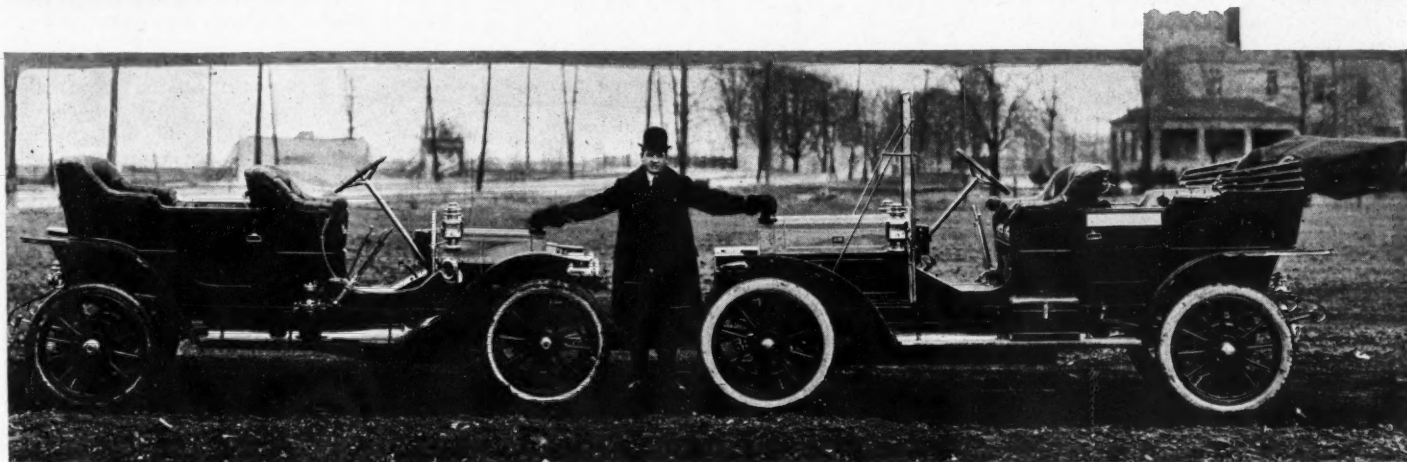
New Maine License Plan—A new section of the Maine motor car law, which went into effect last week, provides a different registration fee. Previously all motor cars of 20 hp. or under paid \$5; now it has been lowered to 15 hp. Those above 15 and under 35 hp. will pay \$10. This will include all the Fords. Those above 35 hp. will have to pay \$15. The secretary of state expects to get a considerable larger sum to be expended upon the highways. The recent heavy rain recently washed out a lot of roads, and carried away a concrete bridge completed on the Portsmouth-Portland road. Repairs have been rushed and many of the highways are in shape again for the summer tourists.



If you own a car you have a likely defense weapon in your possession. This shows Mr. and Mrs. H. M. Busch in their car, showing how the machine gun can be mounted on the car to be used for defense purposes. It is proposed as a home defense measure to station machine guns at points throughout cities and suburban sections so that in case of necessity the people with cars can rush to these points, get the guns, mount them on their machines, and be ready for action. Mr. and Mrs. Busch are touring to show the people the value of the idea and to demonstrate how the gun is mounted



Among the Makers and Dealers



The march of progress sometimes seems slow unless we compare the past and present. A decade ago motor cars were thought to be near perfection in body styles, yet compared with those of today they look like antiques. Above are two Chalmers cars with Hugh Chalmers standing between them. These were modern 10 years ago. Below is a similar illustration with Mr. Chalmers in the same position, but this represents today. Comparison of the two illustrations shows the evolution of the body designer's art

JEFFERS Gets Marmon Appointment—C. E. Jeffers has been appointed chief engineer of Nordyke & Marmon, Inc.

Westinghouse Discontinues Chicago Branch—The Westinghouse Electric & Mfg. Co. has discontinued the Chicago branch of its motor car department, and Chicago territory now will be taken care from the Indianapolis office.

Hayes Increase 250 Per Cent—The Hayes Motor Truck Wheel Co. is planning to increase the production of its plant from 200 to 500 sets of truck wheels a day and will erect new buildings, install new machinery and double the force of employees, besides operating night shifts.

Stanley Declares Dividend—The Stanley Motor Carriage Co., Newton, Mass., has declared its regular preferred stock dividend at the rate of 7 per cent per annum, payable July 1 to stock of record then. Business is reported as unusually good. Deliveries for the last six months show an increase of 200 per cent over the same period a year ago.

Westinghouse Re-Elects Officers—The officers of the Westinghouse Electric & Mfg. Co. were re-elected at the recent election. Three new vice-presidents were created and the following elected: Henry D. Shute, Herbert T. Herr and Walter Cary. H. F. Baetz succeeds Mr. Shute as treasurer. L. W. Lyons was elected assistant treasurer to succeed Mr. Baetz, and W. J. Patterson was

made assistant auditor. An extra dividend of $\frac{1}{2}$ of 1 per cent on common and preferred was declared for the benefit of the Red Cross.

President of Lexington-Howard Dies—Announcement has been received of the death of E. W. Ansted, president of the Lexington-Howard Co., Connerville, Ind.

Fields to Direct Liberty Sales—Joseph E. Fields has been appointed director of sales of the Liberty Motor Car Co. Mr. Fields formerly was sales manager of the Hupp Motor Car Co.

Ward Is U. S. Tire District Manager—Joseph Ward, who has been branch manager of the United States Tire Co. at Indianapolis, has been appointed district manager with headquarters in the same city.

T. J. Sullivan with Puritan—T. J. Sullivan has been appointed assistant to M. R. Hilts, advertising manager of the Puritan Machine Co. The concern now supplies parts for more than 155 orphan cars.

Hill with Empire Axle Co.—Hermann Hill, formerly chief engineer and production manager of the Niles Car Mfg. Co. and previously with the Liggett Spring & Axle Co., has been appointed mechanical engineer of the Empire Axle Co.

Amazon Installs New Laboratory—The Amazon Rubber Co. has installed a complete chemical laboratory in its plant at Akron to make exhaustive experiment in rubber and to perfect, if possible, its tires and tube. H. L.

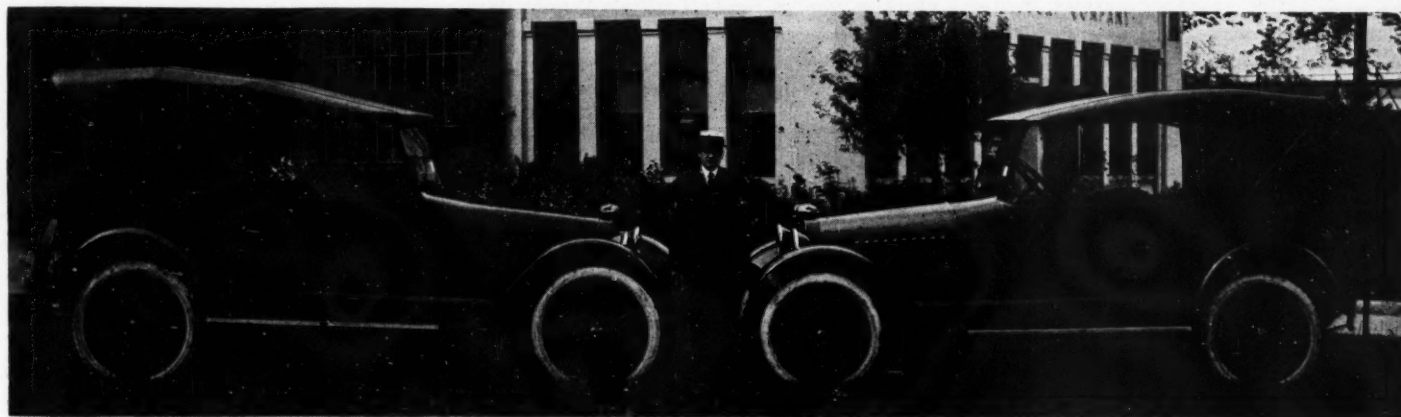
Arbogast has been placed in charge of the department.

James Returns to Willys-Overland—Dave W. James, at one time assistant to John N. Willys, is back with the Willys-Overland company after an extended leave of absence due to illness. Mr. James is assistant manager of the Denver branch.

Wulff Joins McCreary Tire Company—B. F. Wulff, formerly with the San Francisco and Chicago branches of the Kelly-Springfield Tire Co., has resigned to become manager of the sales department of the McCreary Tire & Rubber Co., Indiana-Pennsylvania.

Marathon Managers Hold Conference—The division managers of the Marathon Tire & Rubber Co. held a conference at the home office, Cuyahoga Falls, Ohio, recently. H. H. Repogle, manager of sales, gave a dinner for the managers.

Goodyear Makes Branch Changes—B. S. Waterman, formerly branch manager for the Goodyear Tire & Rubber Co. at Boston, Mass., has been placed in charge of the solicitation of manufacturers' business in all departments for the New England district. He is succeeded at Boston by C. B. Peschmann, who has been in charge of the sales school. K. H. Dress, formerly manager at Springfield, Mass., has been transferred to Akron and succeeded by R. E. Land. Edward Lingfelder, for several years manager of the Los Angeles branch, has resigned to go



into business as a tire dealer. George Bellis, manager at Sacramento formerly, succeeds him. C. B. Reynolds, formerly manager at Tacoma, Wash., is now manager at Sacramento. A. E. Patterson succeeds him.

All Season Makes First Shipment—The All Season Body Co. completed its first shipment of bodies June 30 and made shipment of them to the Briscoe Motor Co., Jackson, Mich.

Pierce Resigns From Regal—Frank L. Pierce, sales and advertising manager of the Royal Motor Car Co., has resigned. Mr. Pierce has not yet made announcement of future plans.

Spring Sales Increase—Sales of the spring division of the Standard Parts Co., Cleveland, Ohio, in the first 26 days of June increased 25 per cent over the corresponding period in May.

White with General Motors—D. McCall White, formerly chief engineer of the Cadillac Motor Co., Detroit, Mich., has been appointed consulting engineer of the General Motors Co. and will work closely in all General Motors divisions.

Smith Motor Truck Declares Dividend—The Smith Motor Truck Corp. has declared the annual quarterly dividend of 2 per cent on its preferred, payable July 15 to holders of record June 30. During the first half of the year the company shipped more than 17,000 trucks.

Stowe to Manage New Tractor Concern—O. M. Stowe has become manager of the 3P Auto Tractor Co., Davenport, Iowa, recently organized to manufacture a tractor attachment for Fords. Stowe formerly was treasurer of the D. M. Sechler Improvement & Carriage Co., Moline, Ill.

Wadhams Oil Building Office—The Wadhams Oil Co., Milwaukee, Wis., one of the largest independent distributors in the northwest, has broken ground for a new office building, 60 by 100 feet, costing \$25,000. The

Albany, N. Y.—Acme Auto Truck Sales Co.; capital stock, \$12,000; to sell trucks; incorporators, G. A. Hubbard, W. T. Byrne, F. Sautter.

Amarillo, Texas—Cullum Motor Co.; capital stock, \$10,000; incorporators, J. R. Cullum, Burl Cavina and T. V. Reeves.

Buffalo, N. Y.—Meldrum Motor Corporation; capital stock, \$25,000; to manufacture motors, engines, etc.; incorporators, A. S. Meldrum, J. F. Hattman and E. A. More.

Clyde, Ohio—Dixie Garage Co.; capital stock, \$25,000; William A. Roush and others.

Canton, Ohio—American Motor Co.; capital stock, \$100,000; to sell automobiles, motorcycles and accessories; incorporators, Clyde A. Volzer, Wm. Patterson, A. S. Vance, and Mrs. Clyde A. Volzer.

Cleveland, Ohio—Ohio Tractor Sales Co.; capital stock, \$10,000; to sell tractors; incorporators, John H. Smart, Carl B. Ford, George Wyman, Wm. T. Bishop and Helen M. O'Boyle.

Cleveland, Ohio—Black & White Taxicab Co.; capital stock, \$50,000; to operate taxicab company; incorporators, Mare J. Groseman, Fred B. Fishman, Vaughan Kaufman, D. F. McIntosh and Arthur Lichtig.

Cleveland, Ohio—Graham Sales Co.; capital stock, \$25,000; to sell automobiles; incorporators, Edward W. Dissette, Ernest J. Durkin, Minor K. Wilson, Gilbert W. Elliott and T. K. Dissette.

Cleveland, Ohio—American Garage Co.; capital stock, \$10,000; to operate a garage; incorporators, Dilow P. Veach, Rollo E. Woodworth, William A. Snyder, P. Bredel and A. L. Dolan.

Cleveland, Ohio—Carbon Eliminating Co.; capital stock, \$10,000; to repair automobiles; incorporators, J. G. Greenberg, B. D. Gordon, B. L. Isaacs, J. M. Bernstein and C. I. McGowan.

Dayton, Ohio—Associated Garages Co.; capital stock, \$10,000; to operate a garage; incorporators, Elmer F. Johnson, John I. White, Herbert M. Dutrow, William D. Schwarting and William G. Pickrel.

Dover, Del.—Trammell Automatic Search Light Co.; capital stock, \$200,000; to manufacture automatic dirigible lights for automobiles; incorporators, William O'Keefe, E. E. Wright, M. Gehrman.

Dover, Del.—Pittsburgh Rubber Tire Mfg. Co.; capital stock, \$1,000,000; to manufacture rubber tires for all kinds of vehicles; incorporators, Wilbur A. McCoy, Charles H. Jones, W. L. N. Luffand.

Dover, Del.—Moon Motor Car Co.; capital stock, \$18,000,000; to manufacture automobiles and parts; incorporators, C. L. Rimlinger, Henry M. Robinson and Clement M. Egner.

Elizabethtown, Ky.—Hot Stone Motor Co.; capital stock, \$10,000; to engage in general automobile business; incorporators, H. T. Potts,

Coming Motor Events

CONTESTS

- July 29—Great Falls, Mont., track race.
- Aug. 5—Billings, Mont., track race.
- Aug. 17—Flemington, N. J., track race.
- Sept. 3—Uniontown, Pa., speedway race.
- *Sept. 3—Cincinnati, O., speedway race, championship.
- Sept. 6—Red Bank, N. J., track race.
- Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.
- *Sept. 15—Providence, R. I., speedway race, championship.
- Sept. 22—Allentown, Pa., track race.
- Sept. 28—Trenton, N. J., track race.
- *Sept. 29—New York speedway race, championship.
- Oct. 6—Danbury, Conn., track race.
- Oct. 6—Uniontown, Pa., speedway race.
- Oct. 15—Richmond, Va., track race.
- *Oct. 13—Chicago speedway race, championship.
- Oct. 27—New York speedway race.
- *A. A. A. championship award event.

MEETINGS

- Sept. 12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, mid-season meeting.

SHOWS

- Aug. 6-10—Fremont, Neb., general tractor demonstration.
- Sept. 2-9—Spokane, Wash., Interstate fair.
- Sept. 9-15—Milwaukee show, State Park fair, West Allis.
- Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers' Assn. State Fair.

former office building at the plant was destroyed by fire five or six months ago and since that time this department has occupied downtown quarters.

Thompson Overland Traffic Manager—F. H. Thompson has been appointed general traf-

fic manager of the Willys-Overland Co., Toledo, Ohio. Mr. Thompson who succeeds C. W. Eggers, was formerly assistant general freight agent of the Michigan Central Railroad at Detroit.

Van Der Wal Opens New York Office—Martin C. Van Der Wal has opened an office in New York as a branch of the head office in Amsterdam, and to look after exports of American articles to the Dutch East Indies. He handles motor cars and is interested in cars of the \$1,000, \$2,000 and \$3,000 class to sell in the Dutch East Indies.

Aeroplane Company Elects Officers—Officers of the Great Lakes Aeroplane Co., Caro, Mich., were elected recently as follows: Directors, L. G. Seeley, W. J. Moore, F. A. Luthy, Clark Daugherty and Fred Hosp; president and general manager, F. A. Luthy; vice-president, W. P. Moore; treasurer, L. G. Seeley; secretary, Clark Daugherty.

Taylor Takes Over Burford—The Taylor Motor Truck Co., Fremont, Ohio, has been incorporated with a capital stock of \$1,000,000. Stockholders of the new company are R. E. Taylor and Robert Willoughby, of New York, and E. M. Sheeman, L. A. De Ran and E. H. Weinhardt, of Fremont. The new company will take over the Burford Motor Co.

Miller Employees Form Company—The Miller Rubber Home & Land Co., is the name of an organization formed by employees of the Miller Rubber Co., to aid in securing homes in the Rubber City. The authorized capital is \$100,000 and the incorporators are William F. Pfeiffer, R. R. Jennings, Richard T. Griffiths, F. C. Millhoff and J. M. Doran.

Pan-American Rubber Incorporates—The Pan-American Rubber Co., Milwaukee, Wis., has been incorporated with a capital stock of \$200,000, by Joseph Huebner, Sr., inventor and patentee of a cellular rubber inner tire for pneumatic type casings for passenger and commercial cars. Mr. Huebner's son and Louis E. Fichaux also appear as incorporators.

Middletown, Ohio—Enterprise Machine Co.; capital stock, \$75,000 to repair automobiles; incorporators, Collin Gardner Sr., Tom Harvey, Granville R. Zecher, E. T. Gardner and George H. Harvey.

New Philadelphia, Ohio—Supreme Motors Corp.; capital stock, \$1,600,000; to manufacture motors; incorporators, C. F. Jamison, Chas. H. Davies, C. N. Mitchell, W. J. Lavery and B. J. Cline.

New Cumberland, W. Va.—Jester Motor Lens Co.; capital stock, \$100,000; to manufacture and sell refracting motor lenses; incorporators, Ronald B. Jester, J. E. Brandon, G. L. Bambrick, J. A. Brandon and S. B. Bambrick.

New York—Ely Auto Equipment Co.; capital stock, \$5,000; to sell parts and accessories; incorporators, R. F. Ely, A. E. Kannengieser, P. Mueller.

New York—Endurance Tire Sales Co.; capital stock, \$10,000; to sell tires, motors, engines and boats; incorporators, J. S. Eskin, J. Burlinson, P. R. Strauss.

New York—S & S Rubber Co.; capital stock, \$5,000; rubber products; incorporators, William Reisdorf, C. A. Cymburg, Leo Kraus.

Newark, Ohio—Jewett Truck Attachment Co.; capital stock, \$25,000; to manufacture truck attachments; incorporators, W. S. Wright and William Schroeder.

Newark, Ohio—Jewett Truck Attachment Co.; capital stock, \$25,000; to manufacture attachments for all makes of trucks; incorporators, William B. Wingerter, William S. Wright, William Schroeder, Bessie B. Wright, and Edward Kibler.

Philadelphia, Pa.—Cunningham Bros. Co.; capital stock, \$10,000; to deal in automobiles and motor trucks; incorporators, F. R. Hansell, J. Vernon Pimm, S. C. Seymour.

Painesville, Ohio—Erie Motor Co.; capital stock, \$25,000; to sell automobiles; incorporators, Frank B. Fultz, R. H. Senkell, Willard J. Hayes, W. B. Lutton and D. S. Conover.

Piqua, Ohio—Piqua Motor Sales Co.; capital stock, \$10,000; to sell automobiles; incorporators, C. E. Emrick, W. J. Sherer, S. S. Faulkner, R. S. Wyatt and O. O. McFarland.

Seattle, Wash.—Vernon A. Smith Motor Car Co.; capital stock, \$6,000; incorporators, Vernon A. Smith, W. E. Schweigart, E. W. Holt and J. C. Michaels.

Safford, Ariz.—Cooper Bros. Motor Co.; capital stock, \$10,000; to manufacture, repair and deal in automobiles and auto accessories; incorporators, Arthur H. Cooper, Horace E. Cooper, Howard M. Hunt.

Trenton, N. J.—Nash Motor Co.; capital stock, \$100,000; to manufacture automobiles and accessories; incorporators, J. L. Brock, H. L. Brock, Verne L. Nash and Elton H. Ertel.

Recent Incorporations

B. A. Williams, T. E. Whitaker, E. W. Potts, S. W. Dungan.

Fort Worth, Tex.—Beale Auto Supply Co.; capital stock, \$7,000; incorporators, C. W. Beale, L. B. Isaacs and E. L. Agerton.

Fremont, Ohio—Taylor Motor Truck Co.; capital stock, \$1,000,000; to manufacture motor trucks; incorporators, R. E. Taylor, Robert J. Willoughby, E. M. Sheehan, L. A. DeRan and E. H. Weinhardt.

Giddings, Texas—Collier Motor Co.; capital stock, \$5,000; incorporators, J. W. Collier, E. M. Collier and W. A. Preuss.

Hamilton, Ohio—Dominion Auto Supply Co.; capital stock, \$10,000; incorporators, L. I. Perkins, Charles Lauckhoff, Minnie Perkins, W. C. Shepard.

Houston, Texas—Double Mileage Tire Co.; capital stock, \$5,000; incorporators, J. N. Bolton, H. H. Rankin and P. B. Spiller.

Indianapolis, Ind.—Britton Carburetor Co.; capital stock, \$15,000; incorporators, Carl G. Fisher, Charles G. McCutchen, Quintin G. Noblitt.

Indianapolis, Ind.—Long Light Lens Co.; capital stock, \$25,000; to manufacture motor car headlights; incorporators, Maurice Louth, Earl Barnes and Fred Trees.

Knoxville, Tenn.—Tennessee Tire & Supply Co.; capital stock, \$10,000; to sell gasoline and tires; incorporators, Chas. W. Parker, A. C. Mahan, Lee M. Ross, W. L. Smith, J. J. Bryant.

Lafayette, Ind.—Auto Accessories Sales Co.; capital stock, \$30,000; incorporators, Harry E. Ruger, Chester B. Whicker and Joseph Scanlon.

Louisville, Ky.—South Louisville Motors Co.; capital stock, \$5,000; incorporators, Ernest Moore and Fred Shubach.

Mansfield, Del.—Keough Automobile Direction Indicator Co.; capital stock, \$15,000; W. H. Mitchell and others.

Muncie, Ind.—Peerless Machine Works; capital stock, \$10,000; incorporators, Charles B. Atherton, Minnie M. Atherton, Charles L. Atherton.